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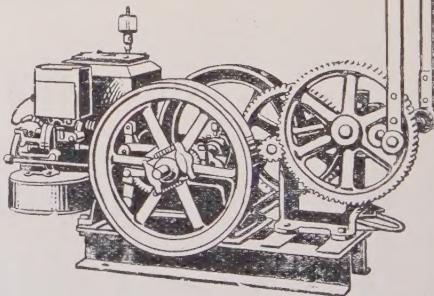
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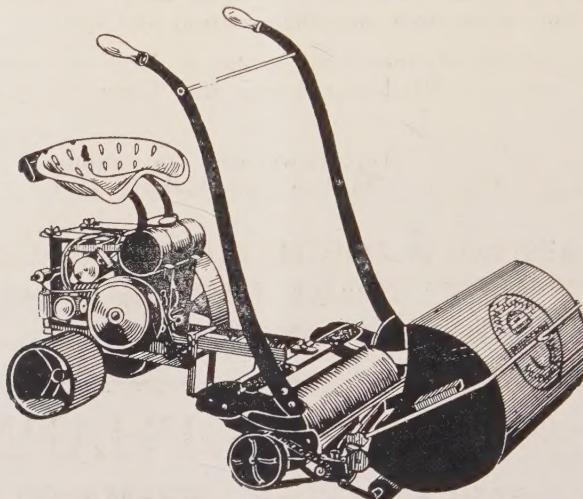
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JOURNAL
OF THE
Department of Agriculture
OF
WESTERN AUSTRALIA.

Vol. 2. (Second Series) DECEMBER, 1925.

No. 4.

FIELD DAY AT THE MERREDIN STATE FARM.

THE EDITOR.

I write for those interested in Farmers' Field Days, and if there is one farmer who is not interested in these valuable demonstrations I fear he is suffering from an intellectual myopia sadly in need of relief.

What is a Farmers' Field Day?

It is an annual exposition of results from patient effort harnessed to trial, experience, experiment and condition; an education in a nutshell; bovrilised farm science. It is a gift from the Government of the day to its husbandmen of knowledge painstakingly acquired, and a plan scientifically designed for the opening up and development of fields and pastures to the limit of the State's soil and climatic capacity. It is also a sign post at the crossroads of success and failure.

If anything were needed to emphasise the popularity of this praiseworthy institution, it was supplied by the throng of interested spectators who foregathered at the Merredin State Farm on October the 16th. Long before noon the farmyards were crowded with visitors from far and near, and as the day wore on and every description of conveyance attached itself to the muster and unloaded its human freight, there must finally have been over 200 motor cars and upwards of 1,000 people assembled.

Although the social aspect of the gathering claimed its meed of prominence, the desire to acquire useful information on agricultural methods was easily uppermost in the minds of those present, and, following a brief opening ceremony by the Minister for Agriculture, Hon. M. F. Troy, a speedy exodus was made for the plots.

The close attention paid to the Director of Agriculture, Mr. Geo. L. Sutton, when explaining the nature and results of different experiments, and the appreciation frequently expressed over the work carried on at the farm, must have been extremely gratifying to the manager and his staff.

The first plot visited was devoted to experiments with fodder plants, of which lupins held pride of place. Late last year fifty varieties of these plants were imported for experimentation, but the results obtainable could not be accepted as reliable. This year the trials are being made from locally grown seed, and it was noticeable that most of the plants looked very promising indeed. Mr. Sutton has been much impressed with the value of this fodder for sheep raising, and stressed as one of its advantages the fact that while sheep did not readily turn to it in its green state, preferring the weeds and natural grasses between the planted rows, later on, when the green feed dies off, the grain of these lupins are relished by the flocks, and they thus provide a natural, cheap and easy method of fodder conservation. Apart from this benefit is the fact that the cultivation of lupins supplies a very desirable increase of nitrogen in the soil.



Minister addressing the Assemblage.

Some experiments with lucerne were attended with partial success, but in explaining these the demonstrator was careful to remind his hearers that the limited rainfall period in the Eastern wheat belt was scarcely conducive to the extensive cultivation of this class of fodder, although it had been proved that small plots could be successfully grown for special purposes. Subterranean clover, too, was in evidence, the plants appearing vigorous and healthy. It is not considered that this perennial can be usefully sown in the wheat belt, being more eminently suited for the South-Western Districts; and regarding its potency for the development of the dairying industry, it was averred that this would do for the South-West of the State what paspalum had accomplished for the North Coast of New South Wales.

Naturally enough the chief interest centred in the examination of the wheat and oat experimentation plots, and as the Director moved from land to land explaining the merits and demerits of type and method of cultivation—this latter embracing a multiplicity of tests including early and late ploughing, mulching, late seeding, rate of superphosphate, rate of seeding, seasonable planting, and “Ephos” phosphate experiments—the multitude

evinced a lively sense of its appreciation, now crowding round the speaker eager to catch every syllable, then straying among the plots examining head and growth of plants; following on again in a long strung-out procession leisurely discussing the pros and cons of the lecturette, and finally spurring forward to be up with the van at the next point of discourse.

Speaking on oat cultivation, Mr. Sutton declared that the farmers of this State were using seed quite as pure as any sown in the whole Commonwealth. As regards wheat, much had been accomplished by concentrating attention on the evolution of varieties from the best stock most suitable to our climate. No other new variety of wheat had achieved the same success as our Nabawa, both in respect to its rust-resisting and flour-milling qualities. Some Agricultural Societies inclined towards an advocacy of red wheat, but with this he was out of sympathy. In the markets of the world Australian wheat held a high place owing to its brightness, bloom and white-



The Crowd "Listening-in."

ness, which rendered it so valuable for blending. Red wheats introduced would lead to a declension of its reputation. A buyer sampling Australian wheat with an admixture of red variety would conclude it was not pure, but adulterated, and in consequence would turn away from it, or at best accept it as an inferior product with a mental precaution against a waning standard. Therefore why cultivate varieties which would reduce the commercial value of those in general cultivation without increasing the yield or giving other compensating advantages. In speaking of artificial manures the Director stated that our own State's manufacture of superphosphate had given the best results over an exhaustive series of tests. One questioner avowed he had obtained better returns from the use of Ephos phosphate, but Mr. Sutton did not dispute the contention. Unusual conditions had often given strange results in State Farm experiments, results which were conflicting with general experience, and so to determine the truth of these things experiments were carried out with eight successive repetitions instead

of two as had been hitherto been the practice, and the final verdict, as stated, had been indubitably in favour of our superphosphate.

Referring to rust and smut prevention Mr. Sutton strongly counselled the dry-pickling method. With wet pickling methods farmers had sown 60lbs. of seed per acre in anticipation of a good return, but, as a matter of



Up with the Van.

fact, only about 50 per cent. of this would germinate with the wet pickle as used by the average farmer, and, in consequence, the actual rate was only equal to about a 30lb. sowing. It did not matter what their machines had cost, it were better to scrap them for old iron or copper and revert to the



A Long-strung-out Procession.

dry-pickling method, which experience had proved to be the better and more effective process. 45lbs. of seed to the acre had proved the best quantity for sowing.

In addressing the gathering at the conclusion of the proceedings, the Minister for Agriculture, Hon. M. F. Troy, expressed his pleasure at finding such a large gathering of farmers with their wives and families, many of whom had journeyed long distances to be present, because it showed an interest in the experiments very encouraging to him as Minister, and to the officers of the Department. It was not merely the reward of remuneration that the officers worked for, it was the joy of the working and the desire to see their efforts appreciated and bringing benefit to the State. No man who had visited the farm that day could return home without feeling that he had profited by his visit. The crops inspected were not up to standard, owing to the light rainfall throughout the whole area of the wheat belt, only



Discussing the Pros and Cons.

5½ inches of rain having fallen through the growing period, with but 24 points in August and 90 points in September. The important thing was they had proved what could be done with a paucity of rainfall, and it was perhaps a blessing for demonstrating purposes they had such a meagre fall of moisture this year. At Merredin during the growing period the rainfall had been limited to little over 5½ inches. Had this happened 12 years ago, before such experimentation as they had seen had developed and proved the value of sound methods of cultivation, it would have been a calamity, a bad omen that might easily have spelled ruin and the abandonment of wheat cultivation in these areas. With selected seed-wheat and modern methods of cultivation a different complexion had been put upon everything. He thought the crops, although they appeared to suffer from the dry spell, would return a fair average yield and proved what could be done by good farming methods with a 5½-inch rainfall. We should no longer fear for the future of the wheat belt after this experience, which

was that of only one year out of ten, and if we continued to suffer only one bad year in ten, and accomplish such results in that one bad year, the future was roseate indeed. He was sanguine that this State would produce wheat crops many miles east of the existing wheat area, and convinced we were on the verge of opening up east of Wongan Hills Railway an area of wheat country extending 70 miles. With such experiments as were being carried out on the State Farms it was confidently hoped that Western Australia would become the premier wheat-growing State in the whole of the Commonwealth. This year experiments at Kalgoorlie indicated they could grow wheat there from which a return could be obtained. It would not be profitable, nor could that be expected under the existing conditions; but Nabawa and Gluyas Early varieties had produced sufficient grain despite the dry season, and with less than $2\frac{1}{2}$ inches during the growing period, to warrant these plots being harvested. He would not prophecy that Kalgoorlie would



A Section of the Park.

yet be a wheat-growing centre, but if they could farm at Merredin on a $5\frac{1}{2}$ inch rainfall, as they had done, then the possibilities were not circumscribed. But the Government believed there was a limit beyond which it would be unwise to send people farming. In Western Australia the Government had financed most of the settlers on the land, as well as many other industries. They thought it better to spend a few thousand pounds to test the country further East before allowing people to go there and then have to spend perhaps half a million pounds with disastrous results to themselves and the State. With a view to determining this limit beyond which they could not go the policy of experiment farms would be further pursued, and it was proposed to establish four more farms—not experiment farms in the sense that Merredin was one—but purely with regard to tillage and rainfall. If these proved that wheat could be grown at a profit then it would be time to finance farmers on these lands.

Referring briefly to the Wongan Hills Light Lands Farm Mr. Troy said that although this land was taken up only last year, 1,000 acres had been

fallowed and put in crop around May last. He thought it safe to say that these light lands, or sand plain farms, to be more correct, presented a more pleasing appearance to-day than did the Merredin State Farm crops, and it was really remarkable to see what had been done in so short a space of time. The ultimate results could only be proved by experiment over a number of years, and he hoped these experiments would result in the light lands of Western Australia, of which we possess 9,000,000 acres adjacent to the railways, proving capable under expert treatment of being farmed for a paying crop or for carrying stock. He further hoped that next year the people would throng there as they had at Merredin, and witness what was being done in that locality, and what was being accomplished by the Government and the Agricultural Department under the Experiment Farms Scheme.

CITRUS BROWN ROT.

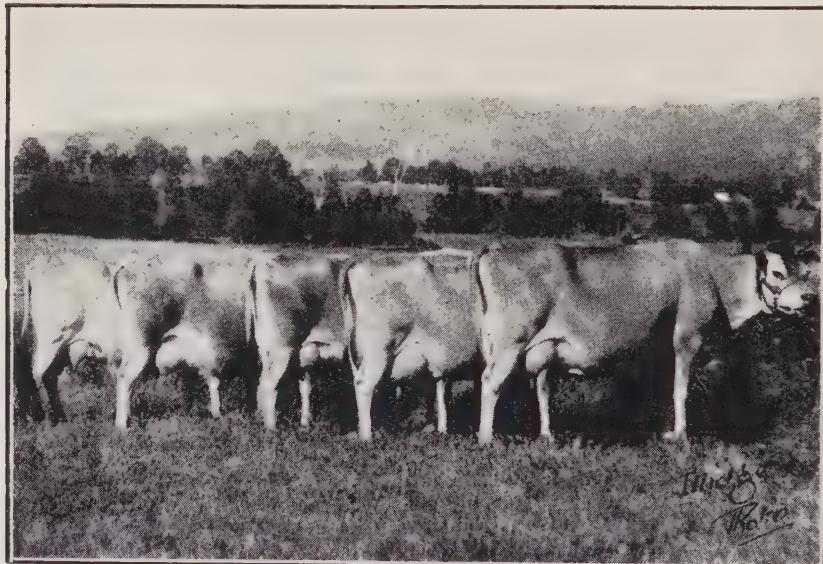
IMPORTANT LOCAL RESEARCH.

What was described by the Director of Agriculture (Mr. G. L. Sutton) as the "turning of the tide" in pathological research from being exclusively conducted in the Eastern States to its being triumphantly initiated in this State, was a paper on the brown rot of citrus in Australia, read at the monthly meeting of the Royal Society on Tuesday evening by Mr. W. M. Carne the Economic Botanist and Plant Pathologist of the Department of Agriculture. The paper dealt exhaustively with the investigations on what was thought to be an American fungus infecting local citrus orchards since 1917, but which showed decided differences from that form, and was subsequently proved by the author to be an entirely new species. He considered also that it was this fungus and not the American species which was found in the Eastern States, and recent Portuguese research indicated that it was the common brown rot of citrus in the Mediterranean countries as well, and not the American brown rot as previously supposed. Mr. Carne showed a number of lantern slides illustrating the life history of the fungus, and mentioned that it could be easily kept in check by thoroughly spraying the lower parts of the tree, up to a height of 5ft., with Bordeaux or Burgundy mixtures, not later than the end of April. The proviso as to the height of spraying was necessary to preserve from the effects of the spray the useful fungi which kept scale in check.

COST OF FEEDING COWS UNDER OFFICIAL TEST AND PROFIT ON SALE OF PRODUCE AS MILK OR FAT.

P. G. HAMPSHIRE,
Dairy Expert.

Following on the policy established last year, complete figures are supplied giving particulars of the average cow production of each of the pure bred herds entered under official test in Western Australia for the year ending 30th June, 1925, together with the value of butter milk, whole milk, skim milk, and the actual cost of feed which the cows consume. In addition to the value of the production if sold as butter fat to the factory—after deducting an allowance of skim milk fed to calf and crediting the cow with the balance at 2d. per gallon—is the value of each cow's produce if sold as fresh milk. This latter factor has been provided for in view of the fact that certain stud masters who are submitting their herds to the official test are producing for sale as fresh milk.



Profitable Pure-bred Dairy Cows.

A group of five registered pure cows, owned by Mr. R. H. Rose, Burekup, W.A.

273 DAYS TEST.

	Herd Book No.	Milk.	Average Test.	Butter Fat.	Butter.	Age.	
		lbs.	%	lbs.	lbs.	years.	mths.
Carnation of Dardanup...	9,995	10,788	5·57	600·99	724·08	5	11
Maranora of Tellaraga ...	6,707	11,509	5·04	580·48	699·37	7	2
Fairy of Dardanup ...	8,942	11,235	4·80	539·41	649·89	6	4
Jean II. of Grass Vale ...	9,996	8,701	5·84	508·93	613·16	2	9
Campanile's Maid of Garden Hill ...	8,935	9,235	5·53	511·18	616·12	10	5

THE HISTORY OF THE CHURCH IN THE MEXICAN STATE OF JALISCO

CHART 1.

Columns.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
Herd.	Average Fat per Cow for period of 9 months.	Average Skin Milk per Cow for period.	Value of Fat for period at 2d. per lb., per gallon.	Value of Skim Milk for period at 2d. per gallon.	Average Value of Fat and Skin Milk per Cow for period.	Cost of Fixed per Cow for period.	Nett Profit per Cow for period through sale of Fat.	Value of Whole Milk at 1c. 3d. per gallon allowing for rearing calf.	Cost of Fresh Milk at 1s. 3d. per gallon.	Cost of Feed for 1000 lbs. of Fat.	Cost of Feed for 1 gallon of Milk.
A	439.75	469	321.3	318.2	3519.5	14.619	2112.7	356.2	2019.4	5.5	5.28d.
B	334.19	427	216.6	217.8	297.7	11.410	2012.4	317.2	2012.4	3.3	4.44d.
C	335.60	388	224.9	215.5	34.8	11.163	1517.0	299.9	1713.9	3.3	5.04d.
D	380.26	512	227.1	214.6	45.5	11.160	162.7	0	2013.6	4.4	5.52d.
E	326.05	368	231.5	215.5	31.4	2116.9	15.9	5	1618.2	3.9	4.92d.
F	322.47	428	231.1	219.4	27.3	14.14.4	12.8	9	31.9	4	4.76d.
G	312.57	312	222.15	212.0	25.7	14.14.4	10.14	0	252.4	4	7.08d.
H	277.55	263	204.9	210.6	22.8	12.8	7	10.14	9	11.7	4.72d.
I	208.37	303	153.0	210.6	17.4	17.4	4	8.18	0	2119.9	4.9
J	297.80	480	2114.4	4.0	2514.4	18.16	7	8.13	9	310	4.32d.
K	357.29	727	260.11	8.11	32.2	1.2	246.9	4	4818.6	1.73	6.12d.
L	252.99	364	18.8	21.9	1.7	13.16.0	7.12	9	2411.9	6.16	6.36d.
M	270.30	570	1914.4	415.0	24.9	4.15.0	19.17	4	2617.8	13.10	6.12d.
N	209.86	299	156.0	29.10	17.15	10	15.9	7	3816.3	18.18	6.36d.
Averages ...	308.58	407	2210.0	3710	2517.0	14.13.2	11.4	8	3010.5	15.9	6.15d.

It will be noted that each column in Chart 1 has been numbered.

Column 1 shows the average number of pounds of fat produced per cow in each herd.

Column 2 shows the average number of gallons of skim milk per cow after deducting 10 per cent. from the production of the cow as cream and allowing 180 gallons per cow for feeding the calf.

Column 3 shows the value of each cow's average production of butter fat at 1s. 5½d. per lb. This was the average nett price paid by the butter factories of Western Australia for the year ending 30th June, 1925.

Column 4 shows the value of the available skim milk after making due allowance for feeding calf and deduction as cream at 2d. per gallon.

Column 5 shows the total value of butter fat and skim milk per cow at price previously indicated.

Column 6 shows the actual average cost of feed consumed by each member of the herd. In this respect careful check throughout the year has been made by the official testers.

Foodstuffs produced on the farm are taken at farm cost values. Concentrated foods which are purchased are taken at the average price ruling throughout the year.

Column 7 shows profit per cow by the sale of butter fat and the value of the surplus skim milk for pig-feeding, after deducting the cost of feeding as shown in Column 6.

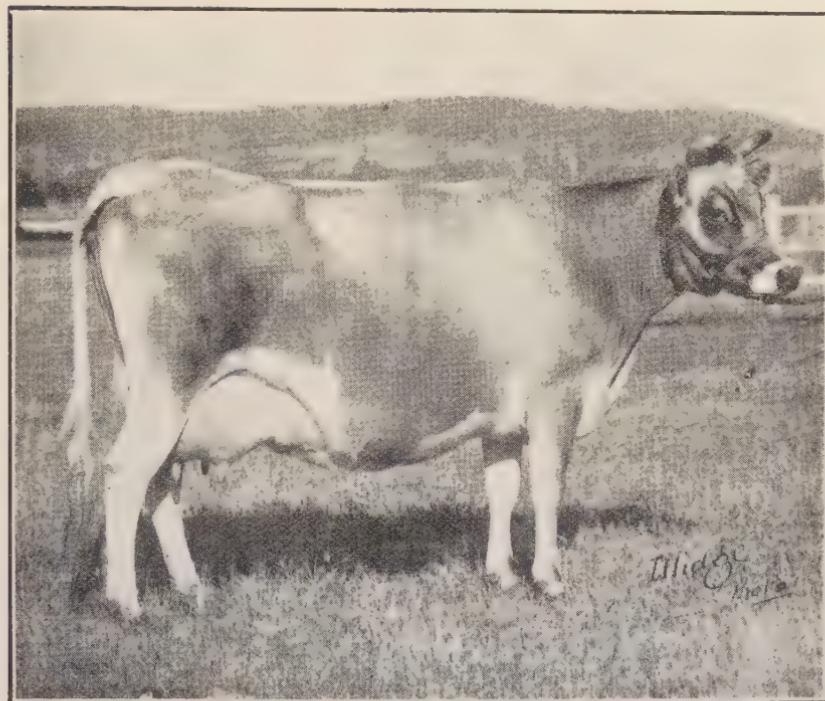
Column 8 shows the value of the milk production of each cow in the herd if sold at 1s. 3d. per gallon, after deducting 45 gallons of whole milk and 135 gallons of skim milk for calf-feeding and crediting the cow with the fat skimmed from the milk which would be obtained from the 135 gallons at 1s. 5½d. per lb.

Column 9 shows the profit per cow for sale of milk at 1s. 3d. per gallon after deducting feed costs as shown in Column 6.

Note.—Certain herds under test are situated near the city and most of their feed is purchased, and, in the circumstances, costs are high. On the other hand, it may be mentioned that these dairymen receive up to 1s. 9d. per gallon for the sale of the milk.

Column 10 shows cost of feed per 100 lbs. of butter fat produced, and enables the reader to judge, not only the cows but the owner, as the cost of producing 100 lbs. butter fat has a bearing on not only the animals but the manner in which they have been fed.

Column 11 shows cost of feed per 1 gallon of milk produced. The figures in this column enable the reader to judge the feeding and production of each cow on the basis of the production of 1 gallon of milk.



Jean II., of Grass Vale, No. 9996, A.J.H.B.

A high-producing Senior two-year old Jersey cow, owned by Mr. R. H. Rose,
"Grass Vale," Burekup, W.A.

PRODUCTION UNDER OFFICIAL TEST FOR 365 DAYS.

Age at commencement of Test.		Milk.	Average Test.	Butter Fat.	Butter.
years.	months.	lbs.	%	lbs.	lbs.
2	9	11,181	6.04	676.22	814.72

AVERAGES OF ALL COWS UNDER TEST.

Chart 2.

- 652 gallons of milk and 308.59 lbs. butter fat per cow.
- 407 gallons of skim milk per cow.

	£ s. d.
3. Value of butter fat at 1s. 5½d. per lb.	22 10 0 per cow.
4. Value of skim milk available for pig-feeding .. .	3 7 10 ,"
5. Total credits to cow for sale of butter fat and skim milk	25 17 10 ,"
6. Cost of feed for period	14 13 2 ,"

Chart 2—continued.

		£ s. d.	per cow.
7.	Profit through sale of fat, after deducting feed costs	11 4 8	
8.	Value of whole milk if sold at 1s. 3d. per gallon	30 10 5	,,
9.	Profit by sale of fresh milk at 1s. 3d. per gallon after deducting cost of feed	15 9 5	,,
10.	Average cost of feed per 100 lbs. fat produced ..	4 18 1	,,
11.	Average cost of feed per 1 gallon of milk produced	6.15d. per gallon.	

In regard to the above, the figures given represent the whole of the cows submitted to official test which have completed the nine months' test, and includes cows which have failed to pass the production standard.



Jersey Cow, "Maranora of Tellaraga," 6707, A.J.H.B.
Owner R. H. Rose, "Grass Vale," Burekup, W.A.

Age.	Milk.	Average Test.	Butter Fat.	Commercial Butter.	No. days under Test.
years. months.	lbs.	%	lbs.	lbs.	
7 2	11,509	5.04	580.48	699.37	273

HERDS, IN ORDER OF MERIT, AS PRODUCERS OF MILK.

CHART 3.

Herd.	Milk. Average Gallons.	Fat. Average Pounds.	Cost of Feed per Cow.	Profit, as Milk.	Profit, as Fat.	Cost to produce 100 lbs. Fat		Cost to produce 1 gallon Milk.	
						£	s. d.	£	s. d.
K	1,007	(1)	357.20	24 6 9	24 11 9	7	15 4	6	16 4
A	721	(5)	439.75	14 6 10	20 19 4	21	12 7	3	5 2
D	768	(3)	380.26	16 2 10	20 13 6	15	17 0	4	4 11
B	674	(7)	354.19	11 4 10	20 12 4	18	2 10	3	3 6
M	833	(2)	270.30	19 17 4	18 18 11	4	12 0	7	7 2
C	631	(8)	335.60	11 16 3	17 13 6	15	17 10	3	10 3
J	733	(4)	297.80	17 0 7	17 3 1	8	13 9	5	14 3
E	608	(9)	326.05	11 7 4	16 18 2	15	9 5	3	9 9
F	675	(6)	323.47	14 14 4	16 14 8	12	8 9	4	11 1
I	536	(12)	208.37	8 16 4	13 3 10	8	18 0	4	4 9
L	604	(10)	252.99	13 16 10	13 0 10	7	12 9	5	9 5
G	546	(11)	312.57	14 13 0	10 9 4	10	14 9	4	13 7
H	492	(14)	277.55	12 8 7	9 11 2	10	0 0	4	9 5
N	532	(13)	209.86	15 9 7	7 1 8	2	6 3	7	7 5
Averages	652	...	308.59	14 13 2	15 9 5	11	4 8	4	18 1
									6.15

Points of interest in connection with Chart 3 are:—

The most profitable milk-producing herd is the fourth lowest profitable fat-producing herd.

The second highest milk-yielding herd is the second lowest profit-making butter fat herd, and is the fifth highest profit-making milk-producing herd.

The fourth highest profitable milk-producing herd is the seventh highest milk-yielding herd.



Jersey Cow, "Girly of Sarnia," 9992, A.J.H.B.

Owner D. Malcolm, "Sarnia," Wagin, W.A.

Age.	Milk.	Average Test.	Butter Fat.	Commercial Butter.	No. Days under Test.
years.	months.	lbs.	%	lbs.	lbs.
5	9	12,750	5.17	660.00	795.18

HERDS, IN ORDER OF MERIT, SHOWING COST OF FEED PER 100LBS. FAT.

CHART 4.

Herd.	Cost of Feed for 100lbs. Fat.	Under Average.	Over Average.
B	£ s. d.	£ s. d.	£ s. d.
...	3 3 6	1 14 7	...
A	3 5 2	1 12 11	...
E	3 9 9	1 8 4	...
C	3 10 3	1 7 10	...
I	4 4 9	0 13 4	...
D	4 4 11	0 13 2	...
H	4 9 5	0 8 8	...
F	4 11 1	0 7 0	...
G	4 13 7	0 4 6	...
L	5 9 5	...	0 11 4
J	5 14 3	...	0 16 2
K	6 16 4	...	1 18 3
M	7 7 2	...	2 9 1
N	7 7 5	...	2 9 4

Average of all Herds ... £4 18s. 1d.



Guernsey Cow, "Velvet of Wollongbar," 774, G.I.B.

Owner Department of Agriculture, Denmark Stud Farm, W.A.

This cow has produced 56 lbs. of milk, testing 4.8 per cent in 24 hours.

HERDS, IN ORDER OF MERIT, SHOWING COST OF FEED PER GALLON OF MILK PRODUCED.

CHART 5.

Herd.	Cost of Feed per gallon of Milk.		
		Pence.	
I	4.32	1.83	...
B	4.44	1.71	...
E	4.92	1.23	...
C	5.04	1.11	...
A	5.28	.87	...
D	5.52	.63	...
F	5.76	.39	...
L	6.12	.03	...
J	6.12	.03	...
M	6.36	...	.21
K	6.36	...	.21
H	6.72	...	.57
G	7.08	...	.93
N	9.72	...	3.57

Average of all Herds 6.15d.

Results show that the Friesian and milking Shorthorn herds are the most profitable milk-producing herds, while the Jersey and Guernsey herds show definitely that they are the most profitable fat-producing herds. In three instances of Jersey and Guernsey herds it is found that there is a

greater profit in selling their produce as butter fat than in selling their produce as fresh milk at ruling market rates. In other Jersey and Guernsey herds there is only a slight margin of profit shown in the sale of their produce as fresh milk as against the sale of butter fat.

Other points brought out in connection with the data available show that the cheapest feeders are not the greatest profit-makers. Cows fed on silage are the cheapest feeders.

It will be noted that the average profit per cow of all cows submitted to the test, including those which failed to pass the standard of production, shows a net profit per cow over cost of feeding of £11 4s. 8d. per lactation period of nine months. To this must be added the value of a pure bred yearling calf.

The data available again conclusively proves the commercial value of the pure bred cows tested in Western Australia.

PRAYER OF A HORSE.

To my master I offer my prayer: Feed me; give me water to drink; care for me. When the day's work is done provide me with shelter, a clean dry bed and a stall wide enough for me to lie down in comfort. Talk to me! Your voice often means as much to me as the reins. Pet me sometimes, that I may serve you the more gladly and learn to love you. Do not jerk the reins and do not whip me when going uphill. Never strike me, beat or kick me when I do not understand what you mean, but give me a chance to understand you. Watch me, and if I fail to do your bidding see if something is not wrong with my harness or my feet. Examine my teeth when I do not eat, I may have an ulcerated tooth, and that you know is very painful. Do not tie my head in an unnatural position, or take away my best defence against flies or mosquitos by cutting off my tail. And finally, oh, my master, when my youthful strength is gone do not turn me out to starve or freeze, or sell me to some cruel owner to be slowly tortured and starved to death. But do thou, my master, if adversity do come, take my life in the kindest way, and your God will reward you here and hereafter.

AN INVESTIGATION INTO THE BRAXY-LIKE DISEASE IN W.A.

H. W. BENNETTS, M.V.Sc.
Veterinary Pathologist.

The term "Braxy-like" was applied by Prof. Dakin to an affection in sheep which was at one time referred to as the Beverley Disease. Even if this were justified ten years ago, which seems doubtful, the present distribution of the disease makes the latter designation unjustifiable. The term Braxy-like has long since been applied to similar diseases in the Eastern States and Tasmania, and may be quite correctly given to the local condition.

1. *History.*—Before dealing with the present investigation it were well to briefly review the position with regard to this condition prior to 1925. The first official record of sheep mortality, ascribed to this cause, was in the year 1915, though some consider the condition to have been existent years before. However, no serious trouble from this cause appears to have been evident until 1915-1916. The trouble apparently originated in part of the districts surrounding the Great Southern Railway, and most of the losses sustained during past years have been in these districts.

The losses experienced were put down to parasitic infestation, feeding irregularities, etc., and no systematic investigation was made until the year 1918, when Prof. Dakin of the University of Western Australia, undertook the work. He correctly defined the condition as being a toxæmia (poisons circulating in the blood stream), but was unable to arrive at the cause, his first conclusions being that the disease was probably not of bacterial or parasitic origin. He recognised its similarity to the so-called Braxy-like diseases in New South Wales, Victoria and Tasmania, and thought the causes might be similar. Feeding conditions were considered to have a bearing on the mortality. He later proceeded to Europe to study Braxy as it occurs in Ireland and Scotland, and to discuss with the Danish authorities the similar conditions in Iceland. A report was furnished in 1921 in which he reviews the position in W.A. and traces the similarity of the W.A. disease to Braxy in these places. He considers the W.A. conditions as being Braxy, but not caused, probably, by the same germ as is responsible in the countries referred to. (Since his visit considerable advances have been made, particularly in Scotland, in the study of Braxy, and the casual germ definitely established.)

The present investigation.—The investigation into the cause of sheep mortality in W.A. is by no means complete, and the purpose of this article is to demonstrate to those interested that something is being done; to define the condition in popular form, so that it may be recognised by those as yet unacquainted with it and so that more information may become available; also to emphasise the importance of the co-operation of sheep owners, without which little can be achieved.

I commenced duty here as Veterinary Pathologist on May the 14th, at the beginning of the season, and though it was impossible that a new laboratory be got into working order for a few months, in view of the urgency of the problem it was decided that a preliminary investigation be undertaken

almost immediately. The purpose of this was to determine the cause of the condition. Under the circumstances, it was only possible, with this end in view, to work along two lines. (1) To collect as much information as possible by visits to affected districts and by means of circularisation of farmers. (2) To conduct post-mortem examinations on as many sheep as possible killed while sick, or examined at the point of death, in an endeavour to find constant changes in the carcase; also to make microscopic preparations of the different organs to determine what changes take place, and, possibly, to find the casual agent.

Accordingly at the beginning of June a short visit was paid to Northam, Burgess Siding, York, and Beverley. The outcome of this visit was the determination to institute a temporary branch laboratory at Beverley at the earliest possible date, making it a centre for investigational work, and to circularise sheep owners through the roads boards of districts where the disease was known to be prevalent. These circulars were distributed as two typewritten forms, one setting out pertinent questions with space for answers, the other, Form "B" set out under the following heads:—

BRAXY-LIKE DISEASE AFFECTING SHEEP IN
THE AVON VALLEY.

FORM "B."

Season 1925.

1. What was the date of the first death from this disease this season ?.....
2. As far as possible a record should be kept this season, in accordance with the following table :—

Date.	Number of Sheep dead.	Age.	Sex.	Breed.	Condition.	Climatic conditions, Dew, Rain, etc.	Type of Pasture.

The response to this latter has been extremely disappointing, and as information thus supplied is likely to be extremely valuable I would like to urge the importance of this matter being attended to next season.

The laboratory was instituted in Beverley at the beginning of July, and used as a headquarters during the remainder of the season, my time being almost entirely given up to this problem.

During this season the following places have been visited in order to obtain information, conduct post-mortem examinations, and determine the general conditions obtaining: Spencer's Brook, Gwambygine, Brookton, Pingelly, Narrogin, Rossmore, Goomalling.

Dakin records the trouble in the following districts (1918): Beverley, Brookton, Pingelly, Mt. Kokeby, York, Spencer's Brook, Northam, Dowerin, Popanyinning, Wandering, Williams, Greenhills, Dangin, Cuballing. With the exception of Goomalling I have received authentic reports from no other districts, but indications are that the disease is much more widely spread.

It is most important to know, as far as possible, the exact distribution of the trouble, in order to determine whether any local conditions, at any rate, predispose to the trouble. In the interests of the State it is hoped that sheep owners experiencing sheep mortality under conditions described hereunder, will report same to the Stock Department.

The whole history of the problem bristles with inconsistencies, and views of to-day have to be modified to-morrow. The following appear to be facts:—

- (a) The disease is seasonal, deaths occurring from June (earlier with early rains) till the end of October or November.
- (b) Apparent illness of very short duration. The sheep are, as a rule, just found dead without any signs of struggle.
- (c) Only sheep in good condition are affected.
- (d) Sheep dead from the disease putrefy (blow up) very quickly.
- (e) Deaths only rarely occur on uncultivated land and cease if sheep are removed from cultivated land, where they are dying, on to bush country.

Mortality commences after the first rains, when feed becomes good, and continues right through the winter months, and often seems to be greater towards the end of the season, when many lambs are lost. The percentage of deaths experienced in a flock may, exceptionally, reach 30 per cent.; individual losses of 5 per cent. for the season are quite common.

Deaths occur at irregular intervals, usually in twos and threes, but sometimes in a large flock as many as a dozen or more may be found dead one morning. Mortality may start at any time during the season, and then stop, as suddenly as it started, without any apparent reason.

Some paddocks appear to be dangerous whilst there are others adjacent to these where deaths have never occurred, though no apparent differences can be detected. Even some farms may remain immune from these extraordinary visitations though all the neighbouring ones have been losing more or less intensely for years.

A farmer may lose heavily one year and escape the next. There seems to be no set of circumstances which can be definitely implicated as giving rise to this condition. The sheep are most often found dead in the morning, and certain conditions appear to favour the trouble, as luxuriant green feed, and light rains, or heavy dew; but sheep will die at any time during the season (May-November), and under any circumstances. In this regard it has been the history in the past that luxuriant rank feed had an important bearing on the mortality and that death occurred most frequently after rain. The present year has been exceptionally dry and the feed generally very short, despite which the mortality this year has been very severe. Losses have been fairly general in the Goomalling district for the first time this year—up to 10 per cent. in some cases. On one place here, where I confirmed the diagnosis by a post-mortem examination on a lamb killed while sick, the feed on the paddock where deaths were occurring was exceedingly poor and there had been little rain for some time.

There is no evidence of the disease being of a contagious character; evidence points rather to mortality being due to circumstances arising after a place has been stocked for some years. Sheep of all ages, from young

lambs to full mouths, may be affected. It has been held by many that young sheep are most frequently affected, but I am doubtful of that being the case. The question of sex and breed seems to have little bearing on the mortality.

Symptoms.—The period between the onset of symptoms and death is very short, and usually the sheep are simply found dead. I have seen a good many sick ones, and they usually show a partial paralysis of limbs, giving rise to a staggering gait, and sometimes knuckling over. There are also signs of nervous excitement (chewing objects, etc.). They soon fall down, lie on the side, often with head turned back on one side. They attempt to rise, and may even do so and walk to another spot. They are at first affected with convulsions from time to time, especially if excited. Frothing at the nose or mouth and grinding of teeth are common symptoms. The temperature is usually normal but breathing often hurried or laboured. Nearly all the affected sheep I have seen have shown signs of scouring, and scoured droppings on the sheep camp is often said to herald the approach of the trouble. Very soon the sheep becomes unconscious, lies stretched out on its side oblivious of any surroundings, and dies. They rarely linger for more than a day; usually only a few hours after showing symptoms. Very often some, or almost all, of the symptoms described may be absent.

After death sheep blow up rapidly, the wool tears out and skin becomes discoloured, and putrefaction is advanced shortly after death.

Post-mortem Findings.—In all, about twenty affected sheep which had just died, or were killed while sick, have been examined, and constant changes found in all cases. Microscopic examinations of organs have revealed the same changes also in all. Parasitic worms are conspicuous rather by their absence than their presence. The first stomach is usually fairly full and normal, though sometimes the contents appear gassy. The fourth stomach and bowels are as a rule fairly empty, the bowels being more or less distended with gas. The bowels always show patches of congestion (pinkish-red colour), outside and inside, through almost their entire length. The gall bladder is usually distended with bile. The lungs are often congested from the mechanical effects of lying down.

These are the more striking changes to the laymen, but the typical and constant changes are slight and easily passed over by the untrained eye. The kidneys, when cut across, are found to be always congested, and microscopical examination reveals inflammation. The liver is slightly softer than normal. Microscopic examination reveals degeneration (always). There are usually small blood spots (petechiae) on the outside of the heart, and large ones (Ecchymoses) on the inside of the heart wall. The changes are those of toxæmia, *i.e.*, there is a poison circulating in the blood and producing changes in many of the organs, especially kidneys, liver, and heart. The starting point appears to be the stomach or bowels; but here lies the difficulty. I have been unable to find any part of the body of which one can definitely say, "Here is the beginning of the trouble; the cause is here."

Even an hour after death, owing to the rapidity of putrefaction, the carcass appears obviously diseased, and is incidentally useless for investigation purposes.

Cause.—With regard to the cause, let it be realised, as most of us realise, that the problem is difficult of solution, and will probably need a

protracted investigation even with all facilities. There are many theories at present held by farmers, none of which are satisfactory.

(a) Sand. It is impossible to consider this as any explanation, for the following reasons: Though sometimes the fourth stomach, or bowels may contain a fair amount of sand, it is always, in my experience, loose, and not causing any blockage, and most often there is only a negligible quantity present. Were this the cause, one would expect the mortality to be greater and infinitely more widely spread. More important still, the changes found in the body are such that could never be produced by this cause.

(b) Superphosphate is argued by many to be the cause, yet superphosphate licks can be given to animals with often very beneficial effects. Sheep will die on bush country where superphosphate has never been used and will not die on many paddocks top-dressed with superphosphate. Also, losses, were this the primary cause, would be universal.

(c) Poison plants. Various plants have been blamed, but it is impossible to sheet death home to any one species of plant, as the mortality occurs under such varied conditions. At least two botanical surveys have been made and nothing suspicious found (Stoward and Herbert).

(d) Soil conditions. Conditions of the soil, notably lime deficiency, have been considered as possible causes. There appears, at any rate, to be no question of lime deficiency in the soil of many of the affected districts, and it would be interesting to see whether top-dressing with lime would have any influence on mortality.

(e) Bacterial. The strongest evidence of the diseases being of bacterial origin is that almost all the picture agrees with the conditions of braxy in Scotland and Iceland, both of which have been definitely proved to be due to the same bacterial cause, also to similar diseases which have been investigated at different times in Tasmania, Victoria and New South Wales, these also being ascribed to bacterial causes.

Both Braxy and Braxy-like conditions found in Australia are seasonal, the circumstances of death are the same, *i.e.*, sheep in good condition affected, sudden death, rapid putrefaction, and death distributed in twos and threes; and the post-mortem appearances are very much alike. The post-mortem appearances are alike, but there are essential differences. Braxy is a disease with a definite inflammation, sometimes necrosis (death) of the lining of the fourth stomach, due to bacterial invasion. The Braxy-like diseases in Victoria and New South Wales are considered to be of bacterial origin. In this case the stomach lesion is absent, but there are necrotic (dead) areas in the liver where the causal organism is found. In our local conditions neither of these primary changes are found—the only essential point of dissimilarity.

Towards the end of the season preparations were sufficiently advanced to permit of a bacteriological examination of diseased sheep being made. Unfortunately it was then only possible to obtain a few subjects, and it is hoped to continue along these lines next season.

Recommendations. It has not been possible, up to the present, to materially add to measures which have already been suggested, some of which appear to have been valuable in certain cases upon the appearance of trouble.

(a) Moving sheep to bush country, or, if this be impossible, shifting them to different paddocks every few days.

(b) Always burn dead sheep.

(c) Feeding of dry feed (chaff) in automatic feeders, throughout the season, adequate provision being made for feeding.

(d) Lieks should prove valuable. The following formula has been recommended: salt, 40 parts; lime, 10 parts; iron sulphate, 4 parts.

(N.B.—The practice of several farmers of yarding sheep or putting them on to bare paddocks every night appears to stop mortality, but appears impracticable and otherwise objectionable in most instances.)

Lines for future work.—It is hoped that next year early opportunity will be given for the continuation of the investigation. It is intended to carry out extensive bacteriological tests, and also to test on a scientific basis the possible value of Braxy vaccine, which has proved so valuable in reducing the mortality, during the last four years, from Braxy in Scotland. The results of a limited experiment with the same vaccine, this year, were rather suggestive.

In conclusion, the thanks of the Department are due to the valuable assistance rendered by the Beverley Road Board, and to many of the sheep owners in affected districts, for their co-operation.

SPECIFIC HEAT.

The quantity of heat, termed specific heat, required to raise the temperature of one pound weight of water one degree of temperature is taken as a unit. Any substance requiring more or less heat than an equal quantity of water requires to raise its temperature one degree is said to be of higher or lower specific heat. Mercury requires only $\frac{1}{30}$ th the quantity of heat that water does, and its specific heat is expressed as .033; hydrogen requires nearly three and a-half times as much as water, its specific heat being 3.405.

ADVANTAGES OF TIMBER.

Timber is stronger than is generally supposed. In tensile strength (resistance to a pull lengthwise of the grain) a bar of certain woods exceeds a similar bar of iron or steel of the same weight and height. A selected piece of yate timber resisted a stress of $19\frac{1}{2}$ tons to the square inch. Timber can stand a far greater distortion than metal without losing its power to regain its original position. In this way timber gives a warning before reaching breaking point.

WHEAT EXPERIMENT PLOTS AT KALGOORLIE.

GEO. L. SUTTON, Director of Agriculture.

The establishment of an Experiment Farm at Kalgoorlie was suggested by the Hon. H. Seddon, M.L.C., in July, 1922, and in March of the following year a request in the same connection was submitted by the Kalgoorlie Municipal Council. Though unable to accede to the request to establish an Experiment Farm, the Hon. Minister for Agriculture decided to approve of experiments being carried out with the co-operation of the Council on somewhat similar lines to those on which farmers' trials were conducted. The Council willingly undertook to co-operate and to provide the land and labour necessary for the operations: the Department undertaking to provide the seed and fertilisers required, and to detail an officer to plan the experiments and supervise them.

The Council entered whole-heartedly into the project, and early in May, 1923, made available for the experiments some 36 acres adjoining their sanitary dépôt. The land in this area was the rich red clay loam typical of the Goldfields country, and on which previously there had been growing Salmon Gum trees (*Eucalyptus salmonophloia*) and scrub. The operations were placed in charge of their Mr. F. W. Cox, who took it up with vigour and enthusiasm. About 12 acres of land intended for the next year's planting were ploughed immediately about four inches deep, and subsequently cultivated as required to bring it to a suitable tilth and to conserve moisture.

No pains were spared to bring the fallowed land into good condition. The planting and supervision of the experiments were placed under the control of Mr. H. Rudall, Field Officer, who arranged that plots of the varieties "Nabawa," "Gluyas Early," Merredin," and "Florence" should be planted in duplicate. The seeding was commenced on April 24th and completed on 30th idem. The seed was sown at the rate of 45lbs. per acre, and the fertiliser—superphosphate 22 per cent.—applied at the rate of 70lbs. per acre. The seed bed at this time was in splendid order, but dry, and in consequence the seed did not germinate until about the third week in May following upon 29, 13, and 14 points of rain, which fell respectively upon the 12th, 14th, and 15th of that month. The seed germinated regularly and well, and for some time continued to grow satisfactorily. Unfortunately, however, the rainfall subsequent to the germination was extremely scanty, the individual falls being as hereunder:

May	25th	...	...	8	points
	31st	...	...	3	"
				11	points.
June	3rd	...	...	6	points
	7th	...	...	3	"
	8th	...	...	5	"
	12th	...	...	1	"
				15	points.
July	12th	...	...	4	points
	22nd	...	...	16	"
	25th	...	...	2	"
	26th	...	...	9	"
				31	points.
Aug.	8th	...	...	21	points
	11th	...	...	3	"
	12th	...	...	1	"
	16th	...	...	1	"
	17th	...	...	1	"
	20th	...	...	2	"
	31st	...	...	3	"
				32	points.
	Total	...		89	points.

Towards the end of July it was evident that the absence of useful rain since the seeds germinated was telling so severely against the crop that it must succumb, and on 28th August Mr. Cox wrote as follows:—

"I am sorry to inform you that owing to the lack of rain the experiment for this season has been a complete failure. The seed germinated fairly well after 66 points of rain, and grew strongly to three or four inches in height, but after that—with the exception of a few odd patches which still survive, but only a few inches high—gradually died off. This is not to be wondered at, considering that we have only had 146 points of rain from the time of sowing until the present date. It is the driest season known to the Goldfields."

Despite this failure the Municipal Council, with very commendable public spirit, decided to continue the work for at least three years, as originally arranged.

The ground for the 1925 crop was prepared by ploughing after the useful rains in September, which commenced on the 9th and 10th of that month, when 72 points were recorded. Subsequent to the ploughing and prior to seeding, the ploughed land was cultivated four times, the aim being to conserve the moisture by cultivating after a fall of 25 points of rain.

As in the previous year, the seed bed was in excellent condition. Seed was sown from 17th to 21st April. At this time the ground was quite moist a few inches below the surface, consequent upon the conservation of the rainfall subsequent to the initial ploughing.

The varieties of wheat planted were "Nabawa," "Gluyas Early," "Merredin," and "Florence." In addition to these the following varieties of oats were planted, viz., "Lachlan," "Guyra," "Burt's Early," and "Mulga."

With the object of facilitating the harvesting of the wheat plots, the oat plots were alternated with the wheat as shown on the sketch hereunder:—

HEADLAN D.
Nabawa.
Lachlan Oats
Gluyas Early
Guyra Oats
Merredin
Burt's Early Oats
Florance
Mulga Oats
HEADLAND

Each plot was 135 links wide and 10 chains long, and was thus slightly over $1\frac{1}{3}$ acres in area.

The rate of seeding was: wheat 45lbs. and oats 40lbs. per acre. The fertiliser used was: superphosphate (22 per cent.) at the rate of 75lbs. per acre.



WHEAT FIELD.



HARVESTING THE CROP, KALGOORLIE.



CHAFFS EARLY.

Trial Wheat Plots, Kalgoorlie, 1925.

Eight days after planting there was an excellent fall of rain which, with that recorded on the succeeding day, totalled 139 points, and this resulted in a good and regular germination of both wheat and oats. Unfortunately, these two falls on the 29th and 30th of April were the heaviest recorded during the growing period, the next heaviest being 37 points on the 10th September, when the crop was so mature that it received little, if any, benefit from it.

The detailed rainfall recorded after the first useful rain for fallowing in September, 1924, until the crop matured, is as hereunder:

Prior to Planting, 1924.				After Planting, 1925.			
September	9th	...	14	April	29th	...	121
"	10th	...	58	"	30th	...	18
"	19th	...	29				— 139
"	26th	...	16				
			— 117				
October	5th	...	5	May	1st	...	5
"	18th	...	8	"	3rd	...	1
"	19th	...	49	"	20th	...	33
"	27th	...	8	"	21st	...	5
			— 70	"	28th	...	6
November	...	...	nil				— 50
			— Nil				
December	12th	...	1	June	15th	...	4
			— 1	"	22nd	...	1
				"	28th	...	3
				"	29th	...	4
				"	30th	...	31
							— 43
January	4th	...	13	July	9th	...	22
"	14th	...	2	"	10th	...	2
"	24th	...	16	"	15th	...	4
"	25th	...	1	"	18th	...	3
			— 32	"	24th	...	1
February	16th	...	68	"	25th	...	11
"	17th	...	47	"	28th	...	6
"	18th	...	1				— 49
"	23rd	...	9	August	7th	...	4
"	26th	...	1	"	17th	...	2
"	27th	...	107	"	28th	...	6
"	28th	...	111				— 12
			— 344				
March	1st	...	23	Sept.	10th	...	37
"	3rd	...	1	"	11th	...	11
"	4th	...	8	"	13th	...	8
"	7th	...	15				— 56
"	9th	...	5				
"	15th	...	5				
"	16th	...	6				
"	24th	...	41				
"	28th	...	5				
			— 109				
April	1st	...	10				
"	10th	...	2				
			— 12				
			685				
							— 349

It will thus be seen that the rain recorded during the growing period was 349 points, but unfortunately, with the exception of the initial rains, most of the falls were light and not of a useful character.

The appearance of the plots when ripe may be judged from the illustration herewith, and though it was recognised that the crops were not a commercial success, it was decided to harvest them in order to ascertain the actual yield produced under such adverse circumstances. The crops were accordingly harvested with the stripper-harvester by Mr. J. H. Langfield, Manager of the Merredin Experiment Farm, who journeyed to Kalgoorlie specially for this work. The acre yields obtained were:—

				bushels.	lbs.
“ Gluyas Early ”	...	...	...	5	17
“ Nabawa ”	...	...	...	5	0
“ Florence ”	...	...	...	3	15
“ Merredin ”	...	...	...	1	54

The quality of the grain produced by the different varieties, especially by “Florence,” was particularly good. The brightness of grain even surpasses that usually produced in the Eastern wheat area.

The results obtained under such circumstances show “Gluyas Early” and “Nabawa” to be excellent drought resisters. It is surprising that a mid-season variety like “Nabawa” has made such a good showing, and an early variety like “Merredin” such a poor one.

Though the trial cannot be regarded as a commercial success, the results obtained are better than some obtained with inferior methods in more favoured districts. They are very useful in that they show how valuable good methods can be under dry conditions, and lessen the fear of a complete failure in the main wheat belt even in a year of unexceptional severity.

The rainfall for 1925 to date amounts to 1,164 points, which, taken as a whole, would be regarded as sufficient to produce a payable wheat crop. The results obtained this year at Kalgoorlie show how unreliable a guide in this purpose is the total. Even with the seed bed in the best of tilth, and with a subsoil quite moist to start with, it is very evident that more importance must be attached to the quantity, the sequence, and the character of the rainfall during the growing period, than to the aggregate quantity recorded during the year, or even during the growing period.

The oats were so short that it was decided not to harvest them, but to leave them to be grazed by the municipal horses. “Guyra” was regarded as having done the best with an estimated yield of eight bushels.

SIMPLE RULES OF MENSURATION.

The area of a circle is about three-fourths the area of a square having a side equal to its diameter.

The circumference of a circle is about three and one-seventh times its diameter.

The length, breadth and height, in feet, of a cistern multiplied together, and the product multiplied by six and a-quarter, will give the capacity in gallons.

THE WOOL CLIP.

H. McCALLUM,
Sheep and Wool Inspector.

PREPARE THE WOOL CLIP CAREFULLY.

Many wool growers have realised that the more skilfully the clip is prepared for market, the greater will be their profit. Often a good wool clip is marred by careless handling, and it is surprising the number of such badly classed clips that can be seen on visiting the Fremantle wool stores.

It must be remembered that no matter how superior the quality of the wool may be, if proper attention is not given to skirting, classing, and packing, comparatively poor prices have to be accepted. The grower very often thinks his wool has been sacrificed by the broker. This is not so, the brokers have done all possible to show the clip to the best advantage, and the cause of the low price is solely bad classing.

A well got up clip, whether large or small, finds a ready sale, but a clip carelessly prepared is difficult to dispose of. The former sells well, even on a falling market, whilst the latter seldom, if ever, realises full value. The time and labour bestowed on the preparing of the wool clip for sale are well expended, and bring their own reward.

METHOD OF SELLING THE CLIP.

Production is advancing rapidly in Western Australia: immense areas of new country have been taken up and stocked with sheep; some station owners are replacing cattle with sheep and turning their attention to wool growing with satisfactory results. Many pastoralists in the settled north, by a lavish outlay of capital are making their country carry many more sheep than they were able to pasture with safety a few years ago, and wheat growers, where possible, are now adopting the safe course of sheep raising with agriculture.

Both large and small clips will annually increase in numbers and, as our local market at the same time is gaining in importance and popularity with the growers, the catalogues—as a natural consequence—will become larger every year, thus making it impossible for the buyers to give as much time as they would like to each individual lot.

The wool valuer's task can easily be imagined; it has to be carried out in a limited time, therefore, it is absolutely essential that there should be nothing to obstruct the buyer. This is well known to the selling brokers, who, desirous that each lot shall receive a full share of attention, offer every facility for examination, and do all in their power to expedite the valuer's progress, even to re-classing badly "got up" clips.

The clips for sale are carefully divided according to their qualities, separate lots being made of fleeces, necks, pieces, bellies, locks, lambs, etc. The sample bales of the various lots are opened out, thereby displaying the contents for inspection, whilst carefully prepared catalogues, giving particulars of brands, number of bales, and description, are ready to hand.

But all the brokers can do, on behalf of the wool grower, will not compensate for careless classing. The fault lies with the grower, who has not done the work satisfactorily, and he it is who must remedy it. Well classed clips are eagerly sought after, and will command keen competition.

In Western Australia every wool grower has the opportunity of visiting the wool stores at Fremantle during that period of bustling activity known as the "wool season." Many hundreds of growers during the year take advantage of this opportunity of comparing their wool with other lots, and of studying the manner in which the various clips are classed. This is a good education, and much knowledge can be gained from talks with the wool experts, who are always ready to inspect and discuss the clips. These visits enable many growers to define the classes to which their wool rightly belongs, and they can fix the relation between the "get up" of the clip and price. The small wool producer, who has not yet availed himself of this chance of seeing the clips on the show floor of the wool warehouses, should do so as early as possible.

The immense stores, which are designed for the display of wool to the best advantage, are admirably lighted from the sides and roof, on the newest and most approved principal. All round are the sample bales of the various clips to be offered for sale, both large and small. They are placed in rows, with ample passage-way between each row. Busily engaged in valuing are the buyers from the chief manufacturing centres of the world. Some give their attention to the larger clips, others devote most of their time to the small lots, whilst many inspect and value each separate lot shown on the floor. Particular lots appear to receive their full share of attention, and there is no doubt but that they will be keenly competed for. Why? The contents are suitable for the buyer's requirements, each bale is of good average quality, and the classing has been carefully done. Other lots, perhaps, on examination prove to be unclassed and unskirted, and many fleeces contain foreign matter. There is not much fault to find with the quality of the wool, but owing to lack of proper classing its market value has depreciated, and it will be disposed of at a much lower price per pound than if it had received careful attention. Why some wool growers continue to neglect the preparation of their clips for market is hard to understand.

When marketing wool the broker should not be hampered with excessive reserves. The experts attached to the wool warehouse know the value of the wool and the state of the markets, present and prospective, better than the grower. Moreover, it is in the broker's interest to realise as high a price as possible for the clip.

VARIETIES OF WOOL.

It is chiefly due to the great variety of wools submitted at Fremantle that so many buyers from overseas visit this State.

Here again is another reason why the grower should visit the wool warehouses. He can thus familiarise himself with the different types of wool produced in various localities, and then select the sheep best suited to his own district. A glance will show that temperature and district in this vast State have a tendency to produce distinct types of wool, and it is essential that a grower selects the type of breed suited to the district in which his holding is situated, that is if he intends making a commercial success of his under-

taking. On the show floor every class used in the manufacture of fabrics can be seen. Here will be found varieties sufficient to suit all climates and requirements, from the far north Kimberley to the southern coast.

ATTENTION TO BREEDING.

The production of wool has, from the earliest periods, been a source of great wealth to those countries where the industry has been fostered. As an article of commerce it is second to none; as a trade commodity its buoyancy and vigour are unsurpassed.

In no place has the development of this industry been more rapid than in Western Australia. Great progress has been made in the past, but the future promises to far outstrip this, and, with such a possibility before them, it behoves all sheep breeders to raise the whole of their wool to the high standard of excellence that some of our best wool has attained. With intelligent management, care, and judicious selection, there is nothing to prevent the bulk of our production being so improved.

Our climate and pastures are favourable to the growth of good wool—well bred sheep mean good wool—inferior animals—wool of little commercial value. Therefore, to increase the poundage per head, only stock that possess some distinct points of excellence must be bred from, and all mongrel and poorly-woollen animals culled out.



HORTICULTURAL NOTES.

GEO. W. WICKENS,
Officer in Charge Fruit Industry.

SEASONAL WORK FOR JANUARY, FEBRUARY, AND MARCH.

January.

In orchards devoted to the production of mixed deciduous fruits, the principal occupation during this month is the gathering and marketing of stone fruit—apricots, peaches, plums, etc.—and care and judgment must be exercised by those who are many miles distant from market in picking and packing the fruit so that, while it has attained a sufficient stage of ripeness to be sweet and juicy, it is still sufficiently firm to stand a long rail journey without opening up in "jam" condition.

If summer rains occur, cultivators must be used as soon as practicable afterwards to conserve the moisture in the soil.

Fruit fly needs constant attention in the infested areas, and no infested fruit should be allowed to remain on the ground, but should be picked up daily and destroyed by boiling. Fruit fly bait should be freely used, and every care taken that no infested fruits are offered for sale.

Apple and pear growers should keep Codlin Moth in mind, remembering that it is once more present in one orchard in the State, and notify this Department at once if anything suspicious is seen to be affecting the fruits named. If this is done and outbreaks which may occur can be dealt with in the initial stages, the pest can be subdued, and the State kept free of the scourge which a general infestation of the orchards would mean.

Red Mite continues to effect a deal of damage, particularly in the apple orchards each year, and where it is present the trees should be sprayed this month with atomic sulphur, using 1lb. in 10 gallons of water.

This is the third consecutive season in which the majority of the citrus orchards in the State have been remarkably free from Red Scale, owing to the excellent work done by the parasite, *Aphelinus diaspidis*. This beneficial insect has now been so widely distributed by the departmental officers that there is no important citrus growing centre where it has not been liberated with the result mentioned above, and present appearances promise that very little spraying or fumigation will be necessary in the coming season to control Red Scale. Where the pest is not being kept under control, spraying or fumigation should be carried out this month.

February.

Gathering and marketing of stone fruits will still be in full swing during this month, and early varieties of pears and apples will also claim attention. The very early pears, such as Citron des Carmes and Jargonelle, are allowed to ripen on the trees, and are fit to gather in December and January, but these are poor in quality, and are not recommended for commercial orchards. Practically all the best pears must be gathered before ripening, and allowed to mellow in storage before they attain the peak condition

of flavour and texture. In a less degree this applies also to apples, but there are some good varieties of the latter fruit which are excellent for dessert purposes when freshly pulled from the trees; Gravenstein and Jonathan being two good examples.

The ease with which the stem of the fruit separates from the spur to which it is attached is a good guide as to the fitness of the fruit for gathering.

This month usually sees the first shipment of apples to England, but it is hoped that growers will refrain from exporting immature fruit this season, and put off export until about the end of the first week in March. This applies particularly to Jonathans, which should not be gathered until they have attained a good rich red colour. The early ripening specimens generally are borne on terminal buds; they are soft and spongy, lacking in colour and quality, and very apt to develop bitter pit and Jonathan Spot on the voyage. They open up so badly on arrival in England that they spoil the sale of later consignments of the same variety, which, when of $2\frac{1}{4}$ in. to $2\frac{1}{2}$ in. in size and gathered at the right time, is one of the best export apples grown. If an early picking must be effected, then Cleopatra is much safer to gather on the green side than Jonathan, but, as stated, the advice is to entirely refrain from exporting immature apples.

Advice *re* Fruit Fly and Codlin Moth, published in notes for last month, apply with equal force during February.

March.

Apple growers will be very busy this month gathering and packing fruit for export, and every care should be exercised so that the good name for quality and appearance which "the apples in the red boxes" have obtained in the London and European markets may be fully sustained. Grade carefully, reject severely, pack honestly, stencil neatly and correctly, and prices will prove remunerative.

This advice applies whether the product exported comprises apples, pears, grapes, or oranges, but the payable price is not so certain with the other kinds as it is with apples; the other fruits being tenderer and more subject to damage during transit.

Continue the war against Fruit Fly, and by watchfulness and immediate action when necessary prevent Codlin Moth from making its home in the West.

THE RED LEGGED EARTH MITE.

Penthaleus destructor (Jack).

L. J. NEWMAN, F.E.S.,
Entomologist.

This mite now constitutes one of the worst of our winter pests. It was first recorded from the Bunbury district in the winter and spring of 1917. Complaints were received that red spider was destroying the potatoes and other vegetable crops. An investigation was made, and it was found that the causative factor was not the red spider, which only appears in damaging numbers in the dry weather, but was a new species of plant eating mite, now known as the Red Legged Earth Mite. The mite was found infesting many different kinds of plants, being particularly damaging to young seedlings and tender foliage.

From this initial outbreak the pest has now become well established throughout the light lands of the South-West and Great Southern, and has penetrated in a lesser degree into the wheat areas.

In spite of repeated warnings not to trade in infested seedlings or cuttings, this was done, with the result that within a very short time outbreaks were reported from widely separated districts.

This acarian or mite is a non-web spinning species, and belongs to the family known as the Eupodidae. Many of the members of this family are predaceous on insects, and therefore beneficial, but, unfortunately, the mite under discussion is wholly a plant feeder.

In continuance of our studies of the life history of this pest, it has been discovered that an error has been made in its generic determination and name. It is not of the Genus *Notophallus*, but belongs to the Genus *Penthaleus*. It is, therefore, proposed to let the common or vernacular name of Red Legged Earth Mite stand, but to adopt the generic and specific name of *Penthaleus destructor* (Jack).

In a recent bulletin issued by the South African Department of Agriculture, there appears a chapter by W. E. Jacker giving a key and general description of the mite known there as the Black Sand Mite.

A study of this key and a comparison of the mite found locally leaves no doubt that they are identical—*Penthaleus destructor*. South Africa and Western Australia appear to be the only countries from which this mite has been recorded. It is evidently a native of South Africa. How it came to be introduced into our State is not known, and probably never will be known. What we do know to our great cost is, that it has become well established within our borders, and will remain a permanent economic factor in the growth of winter crops, particularly in our moist sandy or light loam coastal lands.

Life History.—The pest makes its appearance about the first week in May, following the advent of the winter rains. It suddenly appears in swarms attacking seriously young seedlings which have come up as the result of the rains. So sudden is the attack that many growers conclude that the mite lives and breeds in the soil, and comes forth to attack the young growth as soon as it appears. Others are just as emphatic that it is brought in with

the manure. Both suppositions are entirely wrong. After careful study it has been proved that the mite does not descend into the soil, nor does it feed and breed in manure. There are many kinds of mites, and manure is often teeming with them. These, fortunately, are only scavenger mites, which feed upon decaying matter.

The Red Legged Mite will hide under clods of earth, surface manure, or other rubbish, but will not descend into the soil. The fact of the appearance of the pest in plague form, as soon as the wet season sets in, was evidence that large numbers must in some stage of existence carry through the dry summer months, November to April or May. This period is bridged over by the production towards the end of October of a resting egg. The setting in of dry and hot conditions is evidently the factor which induces the appearance of these hibernating eggs. Myriads are laid about the surface of the soil, under clods or dry weeds and rubbish. These eggs have a wonder-

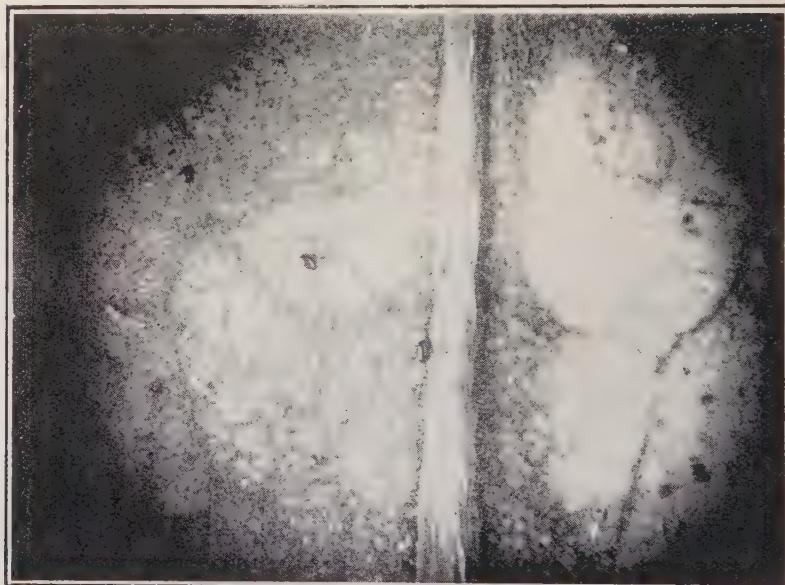


Fig. 1.

(Original.)

Eggs of mite on leaf surface, greatly magnified.

ful resistance to heat, drought, or desiccating winds. Moisture and mild sun heat are necessary for the hatching of these over-summering eggs. Even during winter, if we get a period of dry cold easterly winds, the winter eggs fail to hatch, and the adult insects die off in large numbers. The dryness of the month of August acted as a great check. If the carry-over was slight or more or less accidental, we should witness in May the ones and twos gradually working up to plague form towards the end of the season.

The Eggs.—These are oval smooth bodies, reddish orange colour, attached to objects under clods or rubbish, or placed promiscuously on the backs or undersides of the leaves of the food plant, and can be only detected by the aid of a hand lens. These eggs hatch in from eight to 10 days in winter

or wet season, according to the moisture and humidity present in the atmosphere; dry winds or frosty weather delaying their development. After the hatching of the mite from the egg, the remaining shell appears white. As

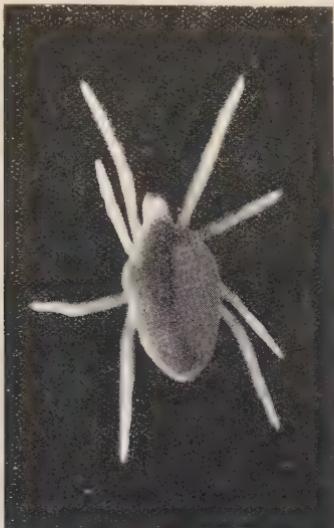


Fig. 2 (Original.)
Adult female, dorsal view, magnified by 20.



Fig. 3. (Original.)
Adult female, ventral view, magnified by 20.

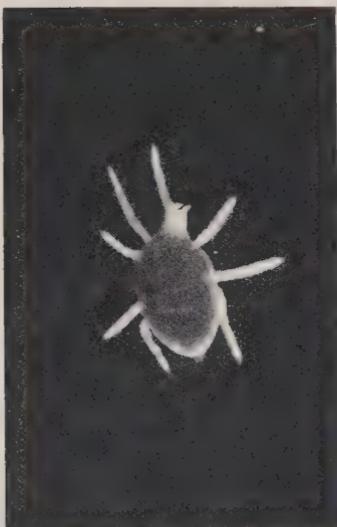


Fig. 4. (Original.)
Adult male, magnified by 20.

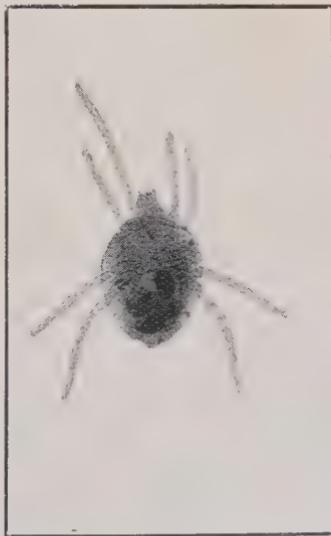


Fig. 5. (Original.)
Adult female, ventral view, showing eggs in body, magnified by 20.

the dry heat of summer approaches egg-laying increases, but hatching diminishes, until finally hatching ceases and the adults die, leaving the carry-over eggs.

The Larval Stage.—The newly-hatched mites are six-legged, bodies dull red, and legs pale. Within seven days of issuing they go through a moult, casting their skin and appearing with eight legs.

The Nymphal Stage.—During this period several moults take place, after the final the adult mite appears. This period occupies 25 to 30 days. 30 days.

Imago or Adult.—Size slightly under 1/25th of an inch, colour: mouth parts and legs bright red, body dense velvety blue-black; the whole being covered with fine hairs. The legs are moderately long, the front pair being the longest and apparently having a sensory function, as in the antennae of insects. The mite is soft-bodied, delicate, and easily damaged when handled. Their powers of locomotion are well developed, enabling them to move rapidly



Fig. 6.

(Original.)

Leaf of plant showing typical injury caused by mite.

over the surface of leaves, ground, etc. On a bright sunny morning in winter this rapid movement may be seen in the swarms of mites migrating from place to place, and thus they spread in all directions when once introduced.

The Mouth Parts.—These are formed for rasping rather than for piercing. The surface of the leaf is broken, and the sap sucked up. These attacked areas of the leaf show up as white or bleached patches, the whole of the green contents having been removed. When numerous, this process of bleaching is more than the young plants can stand, and naturally ends in their death. As the foliage becomes more advanced, the mites do not appear to be able to do much harm, no doubt the skins of the leaves become too tough for them to rasp through. The life of the adult is 30 to 35 days.

Food Plants.—The mite shows first and foremost a preference for the Cape Weed (*Cryptostemma calendalaceum*) and the common Chick Weed (*Stellaria media*). Other weeds are attacked to a lesser extent. In the garden most autumn and early winter seedlings are attacked. Amongst the crops peas, potatoes, lettuce, melons, pumpkins, lucerne, and subterranean clover are the most seriously attacked. The mite is, however, a most cosmopolitan feeder, but, as pointed out, it has certain preferences and increases more rapidly on some plants than others. When badly attacked the young plant simply slowly becomes discoloured, and finally withers up. It is a particularly serious pest when operating over large areas of field peas or clover paddocks. It checks the growth, and largely prevents the production of early winter feed. Later, should the plants survive the early attack, they grow ahead of the pest, and good late spring crops may be reaped.

Distribution.—The mite shows a decided partiality for sandy or light soils. It is certainly found on heavier soils, but does not swarm in countless numbers as on the lighter well-drained lands.

Climatic Influences.—These play a great part in the life of the mite. Moisture and humidity of atmosphere are the main controlling factors in the increase or decrease of this pest. Once the winds and ground become dry, the sun's rays strong, the shade temperature anything above 75 degrees, the mites rapidly die off. Normally, this is the condition of climate by the end of October, and thus few mites are to be found later, except in very favoured and cool moist locations. Mites are to be found in all parts of the world, but appear to be most numerous in temperate regions.

Parasites.—Although mites are perhaps not as abundant in species as insects, they make up for this by the enormous multiplication of individuals. They appear to have few enemies outside of their predatory relatives. Careful observation of the mite under discussion has failed to reveal any natural enemy of consequence. As a casual parasite, the Ladybird (*Rhizobius debelis*) has been observed to feed upon it.

Preventive Measures.—First and foremost, do not trade in seedlings or cuttings from infested gardens. This is one of the chief means of spreading the pest. The eggs are placed on the back of the leaves or on the twigs, and will hatch out in their new environment, and thus a fresh centre of infestation has been created. It is a good plan to always raise your plants from seed, for by so doing many a noxious insect is kept out.

Clean Cultivation.—The presence of weeds and rubbish is an ideal condition for the propagation of this pest. Keep land to be cropped well and deeply ploughed and weed free. Land that has been infested the previous season should be turned over deeply and rolled. By so doing the hibernating summer eggs will be too deeply buried for the mite to be able to reach the surface when it hatches in the autumn.

The mite being an annual winter pest can be easily starved out from any given area, by placing same under fallow for twelve months, allowing no plant growth whatever. Trap crops of peas can be sown with good effect. As soon as the mites have hatched out, and before egg-laying has taken place (which would not happen within 30 days of their hatching), the whole crop should be well ploughed under and rolled. Dip all seedling plants in a solution of tobacco water or kerosene emulsion before planting out. As the pest

thrives in damp and moist sheltered conditions, avoid same. Select, as far as possible, land that is on the heavy side, and use plenty of lime. Avoid the use of any top dressing or mulch, as this only gives harbor to the pest. Upon attempting to spray or dust they fall at once to the ground, and if mulching is present they rapidly crawl under same, and are secure from the treatment. All stable manure should, therefore, be dug in and the ground kept clean of any litter. In the late spring, when the weather conditions have killed off the mites, a summer mulch may be applied. All plants which lend themselves to trellising should be so grown, thus keeping them off the ground and more easily sprayed. The removal of the lower leaves of such plants as cabbage, lettuce, etc., reduces the shelter and renders the plant less liable to attack. Remove and destroy all useless plants. If possible keep a break of cleared land around crop. Raise your seedlings as early in the autumn as possible, thus having them strong and well grown before the mite appears.

It is not of much avail carrying out the before-mentioned preventive measures if, alongside, there exists dirty weedy infested headlands or banks. The mite will readily spread back from this source, and thus the previous good work will be largely nullified.

Treatment.—The great difficulty is that the pest is not confined to the plants we wish to protect, but is found swarming over the surrounding weeds from which they swarm back. Herein lies the virtue of clean cultivation and farm sanitation.

With a view to overcoming this pest, the Entomological Branch has carried out a large series of experiments during the past winter. To reduce the cost of treatment an attempt was made to incorporate with a manure a mite-killing agent, and thus produce a combined mitecide and top dressing fertiliser. By the application of such a combination the mite would be checked, and at the same time the crop would be stimulated into vigorous growth. Top dressing of field crops is a profitable undertaking, and if for the one cost of application a combined mitecide and fertiliser is used, two purposes are served at the one cost of labour. The final results of the various experiments gave the conclusion that a mixture of Carbolic and Thomas's Phosphate or Superphosphate effectively destroyed the mite. It was found that the thorough mixing of the following gave excellent results:—1lb. of 15 per cent. Carbolic powder, 3lbs. Thomas's Phosphate or Superphosphate. When mixed it is advisable to use as soon as possible. It is wise to only mix sufficient for daily use. This dusting powder may be applied to small areas by hand; through a perforated tin; per medium of puffers or sulphur bellows. Over large areas a super spreader gives good results. The ordinary farm drill may be used by removing the tubes, and allowing the powder to drop on to a sloping board. The main object is to get a good even distribution of the dusting powder over and around all infested plants. It is recommended that at least one cwt. per acre be used.

Lime, tobacco dust, or some inert carrier may be used to mix with the carbolic powder. Any strength over four per cent. carbolic content has a tendency to burn some plants. By breaking down 1lb. of 15 per cent. carbolic with three pounds of any carrier you have roughly a four per cent. carbolic mixture. The time to apply the dusting is after 11 a.m. and up to sun-down on fine days. The mite does not become active until the foliage has become dry. If dust is applied to wet foliage it becomes largely inoper-

ative, owing to its caking on the leaves. Being purely a contact powder, it is only wasting material to apply if the mite is not present. The carbolic is the killing agent, and is very fatal to the mite, but has no effect upon the eggs. It is, therefore, necessary to repeat the operation after an interval of 10 days. The cost of this treatment, which is not excessive, is greatly offset by the extra returns received from an area so dressed. Another dusting powder which gives good results is made as follows:—half a kerosene tin of tobacco dust, half a kerosene tin of lime, half pint of kerosene. Add the kerosene to lime over night, mix all together and apply. Dusting powders, based on the departmental formula, are obtainable.

Black Leaf 40: 1lb. to 70 gallons of water, adding 3 lbs. of soap, is a very effective wash. The soap is shredded and dissolved in boiling water, and then stirred into the bulk. It is a contact wash, and only kills those mites that are reached by it. Apply with a spray pump or syringe.

Kerosene Emulsion:—Kerosene, 2 gallons; Sunlight soap, $\frac{1}{2}$ lb.; naphthaline, $\frac{1}{2}$ oz. Dissolve the naphthaline in the kerosene. Boil the soap in one gallon of water. When boiling remove to another vessel, add the kerosene and naphthaline and churn violently for 10 minutes. This will form a creamy mass, which thickens on cooling. This constitutes a stock solution. When using, add one part to eight parts of water, and apply with spray pump.

Note.—Being a sap sucker, it is useless spraying with poisons such as Arsenate of Lead, Paris Green, or any other internal poisons. Contact sprays or powders only are effective, and the success of these depends on the thoroughness of application.

Summary.—The Red Legged Earth Mite attacks nearly all cultivated vegetables and garden flowers. It also attacks clovers, oats, peas and other field crops. It occurs in harmful numbers during the wet season from May to October. It is worst on light, loamy soils and sandy country. It can be largely prevented by clean cultivation and fallow, and can be destroyed by contact dustings and sprays.



POULTRY NOTES.

W. T. RICHARDSON,
Poultry Adviser.

CHICKEN POX (WARTS).

This disease is frequent in hot climates, such as ours, and recurs in the Autumn. First season birds—cockerels and pullets—are subject to it, particularly so when late hatched, and frequently whole flocks are affected. Matured birds are rarely attacked.

Like with many other poultry complaints, sanitary surroundings play a leading part in checking its appearance and progress. To expect birds to be in the best of health in dirty yards and houses is to expect the impossible, and sooner or later they will become victims of their owner's neglect.

Prevention is always better than cure, and this applies to Chicken Pox, also known as Warts, and measures have to be taken before this disease puts in an appearance, so that in case of an outbreak it may be easily and speedily checked.

Start with your yards and see that your birds are in clean, healthy surroundings. Remove all droppings and litter at regular and frequent intervals, long before any accumulation of dirt stares you in the face.

The symptoms of Chicken Pox are generally visible from the outset. Light coloured patches or points, frequently round in shape, and in varying numbers and size, break out on the face, wattles or comb. They reach their maximum size in four to six days. These patches extend rapidly and in turn become yellowish in colour; matter forms, they quickly ripen, become dark brown, and develop into a hard dry scab, often extending till the eye is completely covered. If not attended to, the bird is likely to die from starvation unless hand fed, or lose the sight of one or both eyes.

As this disease is both infectious and contagious and spreads rapidly, affected birds should be isolated immediately and the houses and perches disinfected with carbolic acid in five per cent. solution.

According to Ulenhuth, Schmid, Sigwant, and others, the virus of Chicken Pox is capable of causing avian diphtheria (*roup*).

Treatment should commence long before Chicken Pox is prevalent, the object being to build up the system to resist the outbreak. Start on the first week in January, and for three consecutive weeks give Epsom Salts twice weekly at the rate of one ounce packet to the gallon of drinking water. For the next three weeks add Sulphur to the mash (wet or dry) twice weekly in the proportion of one ounce to fifty adult birds (five months old or over), younger birds in proportion. Keep alternating Epsom salts, then sulphur, every three weeks, as above, till well into May. By following out this treatment very little trouble should be experienced.

Should Chicken Pox break out, however, paint the patches or sores referred to with tincture of iodine, a 2 per cent. solution of formalin, or an ointment of glycerine, vaseline or lard, containing 2 per cent of carbolic acid and 70 per cent. alcohol, every other day.

In advanced cases remove the warty growths, bathe the head thoroughly with a 2 per cent. permanganate of potash solution, or peroxide of oxygen, and when dry paint as above.

A liberal supply of green stuff, fed regularly with, or independent of, the mash will materially help to ward off this disease.

Poultry-keepers should bear in bind that affected pullets will go off the lay. This must be guarded against, as warts are prevalent when eggs realise top market prices for the year.

THE USE OF DRY PICKLED WHEAT FOR POULTRY.

W. T. RICHARDSON,
Poultry Adviser.

Several inquiries have been received regarding the probable effects of feeding fowls on wheat treated for smut with copper carbonate, and doubts existing as to the results of such feeding, two tests have been conducted recently with wheat prepared by the Government Botanist, particulars of which are as follows:—

No. 1 Test.

Commenced 14th October. An aged hen (Orpington-Leghorn cross) was fed twice daily on wheat treated with copper carbonate—2 ozs. to the bushel—till the 21st October with no apparent harmful effects. Thence the strength was increased to 4 ounces to the bushel of wheat and fed twice daily till 28th October inclusive, with negative results. During the test this hen laid a number of eggs.

Approximate quantity consumed—

1½ lbs. dry pickled wheat, 2 ozs. to the bushel.

1½ lbs. dry pickled wheat, 4 ozs. to the bushel.

No. 2 Test.

From 29th October till 7th November, inclusive, one White Wyandotte Cockerel, about three months old, was fed daily on treated wheat (4 ozs. to the bushel) and showed no harmful effects at the conclusion of the test.

Approximate quantity consumed—

2 lbs. of pickled wheat.

Both birds were post mortem after the test and, notwithstanding the fact that in both tests treated wheat to twice the strength used in dry pickling was fed, their internal organs showed practically normal conditions, the exception being a few pin head haemorrhages in the heart and caeca.

COOKING OF MEATS.

MARGARET A. WYLIE,
Inspectress and Organiser, Domestic Science Classes.

Boiling meat is a more economical method of cooking than either roasting or baking; it requires less fuel and labour, and the meat loses less in weight; the meat is rendered very digestible. The flesh of young animals loses much of its bulk in boiling, because the albumen and fibrine of which the young tissues are composed are dissolved in the water.

Boiling Meat.

1. Wipe, weigh, and trim the joint.
2. Allow time for cooking. This is the same as for baking, *i.e.*, 20 to 25 minutes for every pound, and 20 minutes extra.
3. Put the meat into boiling water. Boil 10 minutes to set the outside albumen.
4. Simmer for the remaining time.

Salted Meats.

Salted or pickled meats are cooked differently from fresh meats. Here is found the exception to the rule as regards placing the meat in boiling water to harden the surface albumen. The salt used in the pickle closes the cut surface of the meat so much so that it requires opening a little to enable the fibre throughout the joint to be softened and made tender. The following directions are suitable for corned beef, corned mutton, and pork:—

Time for cooking—

1. Allow 25 to 30 minutes to every pound.
2. Wash the surface of the meat quickly in cold water.
3. Place in a pot of lukewarm water with one tablespoon of lemon juice or vinegar. (The acid helps to soften the fibre.)
4. Bring slowly to boiling point, and then let it simmer for the remaining time.

Facts about meat.

There is a large amount of water in meat, for instance—

1lb. beef contains $\frac{3}{4}$ lb. water, $\frac{1}{4}$ lb. nutritive substance.

1lb. mutton contains $\frac{3}{4}$ lb. water, $\frac{1}{4}$ lb. nutritive substance.

1lb. pork contains $\frac{3}{5}$ lb. water, $\frac{2}{5}$ lb. nutritive substance.

1lb. fat beef contains $\frac{1}{2}$ lb. water, $\frac{1}{2}$ lb. nutritive substance.

On this account ovens should be provided with valves or ventilators to permit of the escape of steam. If it does not escape the outside of the meat cannot become crisp, and loses a lot of its valuable flavour.

The average loss in weight during cooking is:—Roasting, 30 per cent.; baking, 25 per cent.; boiling, 20 per cent.; frying, 15 per cent.; steaming, 15 per cent.; grilling, 12 per cent. During the cooking of meats an appetising substance, termed osmazone, is developed. This helps to stimulate the flow of gastric and other digestive juices.

Roasting.—The flavour developed in the browning of meat is spoiled when the fat is too hot. This overheating divides the fat into fatty acids and glycerine, and forms a substance known as acrolein which is irritating to the membrane of the stomach. This overheating or burning of fat must be guarded against whenever fat is used in the cooking of meat.

Stewing.

Stewing is cooking meat in a small quantity of liquid for two or three hours. By this plan the gelatine is extracted from the bones, the juices drawn out to form gravy, and the fibrous parts rendered digestible.

This is a nourishing and economical method of cooking meat, as the cheaper cuts may be used to advantage, and as the meat is served in the gravy there is no waste.

There are two classes of stews—brown and white. Brown stews are made chiefly from beef and mutton; white stews from tripe, rabbit and veal. They are best cooked in a double saucepan, thus obviating the need for constant attention, but the work may be carried on at the side of the stove with very little firing. Stews are started with cold liquid, and then brought to boiling point and kept simmering. For brown stews the meat is fried lightly first to improve the flavour and appearance of the dish. They may be thickened with browned flour, wheat meal or sago. White stews should be cooked in a white-lined pan. They are usually thickened with flour and enriched with milk.

For varieties and directions for stewing, I would refer our readers to "The Golden Wattle Cookery Book," published by E. S. Wigg & Son, Perth.

Salting and Pickling Meat.

Pieces of meat suitable for pickling are:—Round of beef, leg of mutton, ox tongue, leg of pork, hand of pork, sheep's tongues; but almost any cut of meat may be preserved by pickling.

The general requirements are:—a large earthenware crock or a clean barrel, tight enough to prevent leakage. A cover of thick hessian or bagging with a loose board cover weighted down.

The following recipe for the preparation of brine is a good one:—6lbs. salt or 3lbs. common salt, 3lbs. bay salt, 2lbs. white sugar, 2ozs. saltpetre, 3 gallons of water.

Method.—Boil these ingredients for half an hour. Skim and cool. Pour into the barrel. Place in a cool place.

1. The meat should hang for a day or two if possible.
2. Remove the kernels and pipes and unnecessary flaps.
3. Rub the surface with dry salt and, if possible, allow to stand another day. Turn each day and rub again with salt. Drain well.
4. Immerse in the brine. Pack cuts as closely as possible, taking care to cover well with the brine. Cover with bagging and weighted lid.

The pickle for meat may be used again and again, if boiled between each pack and extra water and fresh salt added. Sugar makes the meat more tasty. Saltpetre colours it, but tends to make it dry.

Meat may be kept in this way for two or three weeks, but will be ready for use in about five days.

To Cook a Ham.

Method No. 1—

1. Soak the ham for 12 hours. Scrape well.
2. Place in a boiler with sufficient cold water to cover.
3. Bring to boil. Skim well. Draw to side of the fire and simmer until cooked. Allow 25 to 30 minutes to the pound, according to the thickness of the ham.
4. When ready, remove skin and trim neatly.
5. Sprinkle thickly with browned bread crumbs.

No. 2—

1. Soak ham for 12 hours. Scrape well. Dry.
2. Prepare a paste of 2lbs. flour and water.
3. Roll out paste and wrap it round the ham.
4. Place in baking tin with a cup full of dripping.
5. Bake in a moderately hot oven three or four hours. Baste frequently.
6. Remove skin, trim neatly. Sprinkle thickly with brown crumbs and grated nutmeg.



COLLAPSIBLE SOILED LINEN BASKET FOR BEDROOM USE.

MISS M. A. WYLIE,

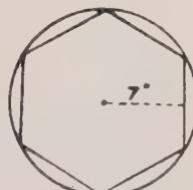
Household Management Centre, Education Department.



A few of the articles made at the Household Management Classes,
James Street School.

Material.—2 yds. cretonne; $1\frac{1}{4}$ yds. narrow ribbon; 2 yds. lining; $1\frac{1}{2}$ yds. wide ribbon; three sheets of extra strong strawboard.

1. Draw a hexagon with a 7in. radius for bottom.
2. Cut sides 7in. x 29in. (six pieces).
3. Draw a hexagon with a $7\frac{1}{8}$ in. radius for lid.

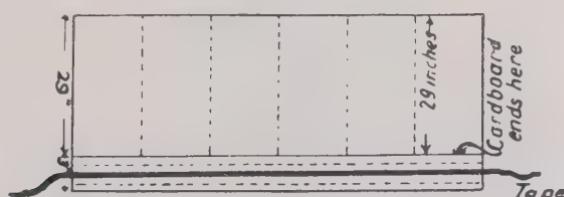


4. Cut sides of lid $7\frac{1}{8}$ in. x $1\frac{1}{2}$ in. (six pieces).

5. Cut material 45in. x 33in. and place right side of material together, then machine across top and down one side. Turn right side outside and press.

6. Place first long strip of strawboard in, fit tightly, tack or machine as close to strawboard as possible.

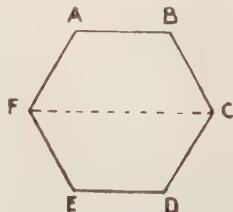
7. Repeat for the next four strips; the last one must be top sewn, first turning in cretonne and lining neatly.



8. Make a "heading" for tape at bottom.

9. Top sew the first and last sides together.

10. Thread tape through and draw to fit.
11. *Bottom and Lid.*—Cut material and lining one inch longer all round than strawboards.
12. Place cretonne and lining together and sew three sides F. to C. by machine. Turn right side out and press.



13. Place cardboard in; turn in edges and top sew.
14. For lid, cover the six small pieces of cardboard with cretonne and lining, and top sew to the larger hexagon. Sew small ribbon over edge and trim top with a large bow.



Soiled linen basket made from cardboard and cretonne (hexagonal basis).

15. A *hat-box* may be made with same directions on a base of a 10in. hexagon for box and 10½in. for lid.
Side pieces to be 10in. x 12in.



Hat Box made on hexagonal basis—made from cardboard and cretonne.

A *waste paper basket* is made with a 5in. base and sides 5in. x 16in. No lid is required.

THE GENESIS OF THE RABBIT.

C. J. CRAIG,
Chief Inspector of Rabbits.

Some of the early records of the various settlements in Australia make reference to the introduction or existence of rabbits, but whether these records refer to grey rabbits or to the white furred, pink-eyed variety is not clear.

It is apparent that rabbits accompanied the expedition that founded the settlement on the shore of Port Jackson on 26th January, 1788, for a return issued by Governor Phillip on 1st May of that year, and printed in the Historical Records of New South Wales, shows that the live stock on the settlement included rabbits. Whether they were white or grey rabbits is not stated, but it is believed they were the former. Many of the early colonists kept white rabbits in hutches, and there was a considerable traffic in them in the market places. From time to time many escaped from captivity, and sought shelter under the houses about the settlements. Either they were unable to survive the conditions in the wilds, or they were by nature or experience more fitted for a semi-domesticated existence, for they usually remained about the inhabited areas, and did not appear to travel far into the surrounding country.

It is believed that navigators of the time, possibly for the purpose of providing food for any vessel passing later, brought out a number from England or the Continent, and released them upon the islands along the coast. It has been reported that they were numerous on Rabbit Island, close to Queenscliff, in the early forties. Flinders Island, which is adjacent to Tasmania, was at that time a settlement for the aborigines deported from Tasmania, and its inhabitants were sometimes supplied with rabbits taken from Rabbit Island, as also were the whalers.

According to press records the Black Ball clipper "Lightning" arrived in Hobson's Bay on the 25th December, 1859, having on board four hares, 66 partridges, and 24 wild rabbits, consigned to Mr. Thomas Austin, of Barwon Park. These rabbits were the first to become acclimatised upon the mainland, survive the attacks of their natural enemies, and spread into the adjoining country and beyond.

When they once became established, many landholders from other parts sought, as a great favour from those that already had them, two or three pairs with which to stock their estates, and were extremely grateful to be the recipients of such esteemed gifts. One landowner at least, as a considerate provision for their comfort and safety, had constructed, prior to their arrival, hutches and artificial burrows in the sandy hillocks upon his estate, and took every precaution to protect them. For an employee to be caught killing one meant instant dismissal. In some instances a gamekeeper was kept to kill off the native cats, and so protect the rabbits. Another landowner from Glenisla procured a dozen rabbits at £1 each, so that his children might have some good shooting in a few years' time. That landowner afterwards stated that those dozen rabbits had eventually cost him £1,000 a head.

About 1860, at attempt was made to farm rabbits and to dispose of the carcases for consumption, as is shown by the following extract taken from a copy of the Castlemaine "Advertiser," published in 1863, under "Rabbit Growing":—

"In these days when so much attention is directed to the introduction of new industries, it will be interesting to our readers to know that for the last two or three years there has been started a most novel and useful speculation which, while it will return a very handsome profit, we hope, to the spirited originators, it will prove a vast service to the community. We allude to the large rabbit warren established by Messrs. Gravenor and others beyond Guildford. Upwards of 200 acres of land, hill and dale, have been fenced in with seven-foot pailings sunk two feet in the ground, and originally about 50 couples of rabbits were turned out about two years ago. With extraordinary fecundity for which bunny is celebrated, these fifty have increased to so many thousands. So much so that in a few weeks the proprietors will be in a position to regularly supply the neighbouring markets of Castlemaine and Daylesford, and will soon extend their operations to Sandhurst and the great metropolis. The great relief, in summer time especially, of being able to obtain some unusual food other than the eternal mutton and beef of the good old times, makes this enterprise of considerable interest to the public, and the large revenues which the owners of extensive rabbit warrens in England obtain, point to the speculation as one which ought to amply repay its spirited originators. We should not omit to state that the most extreme care is exercised to prevent depredations either by wild dogs or dishonest men. A night watch is systematically kept. This new industry has been introduced unaided by the State, the land having been purchased by the proprietors. We can only say that we trust that their pluck and patience will reap the reward so eminently due."

The paling fence was afterwards destroyed by a bush fire, and the rabbits escaped to the surrounding country, and eventually spread over the whole district.

It cannot, of course, be said with absolute certainty that the couple of dozen wild rabbits introduced by the late Mr. Austin, were those only of their kind that had ever been brought to Victoria, but no authentic record of any other importations appears to exist, and everything points to the Barwon Park rabbits having been the real originators of what soon became known as the rabbit pest. Three years after their arrival they had attained such numbers as to be already looked upon as a nuisance in the locality. The other imported game—hares and partridges—were reported to be thriving well; but, according to the "Argus" of that day, they were completely outstripped by the rabbit.

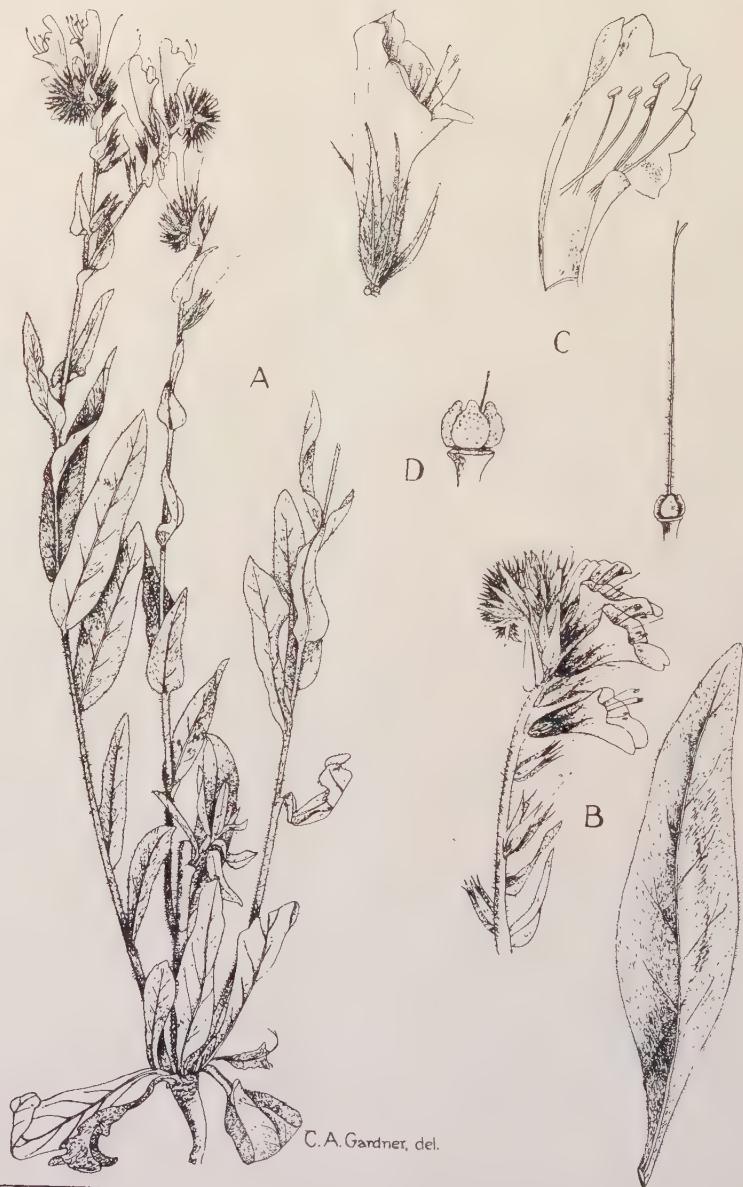
¹ Bunny soon started travelling, following up the Barwon River and its tributaries, thence out across the northern and western plains—marching on and ever onward, till at long last he has bumped up against the Indian Ocean on our shores here of Western Australia. It seems somewhat curious that the trend of the rabbit advance should always have been westward and northward. In places where the features of the country or other conditions specially invite them, they will of course make their way in other directions, but in the main the tendency is towards the north-west resembling very much a bush fire with a south-east wind behind it, their progress north-westward is impetuous and rapid, whereas they work to the east and south

very slowly, as the bush fire eats its way back against the wind. This is well illustrated by the fact that it took the rabbits just as long to make their way from the Barwon near Geelong into the heart of the Gippsland district, as it did for them to travel from the same starting point into far off Western Australia.

From the earliest stages of his peregrinations, the rabbits first appearance in a district has always aroused considerable interest, but seldom anything approaching to dread. To the Australian boy, bred in an infested area, the presence of bunny was an unending source of holiday enjoyment, and no doubt many will be inclined, like the writer, to say that one of their greatest delights, as soon as they were old enough to carry a gun, was to stand over a warren in which ferrets were operating, and bang away at the rodents as they broke cover and bolted in terror from their little pink-eyed tormentors; or to stalk them in the gloaming as they emerged from their "dugouts" in search of their evening meal. To many of those of larger growth bunny's presence was viewed in a more practical light, and the forwarding of well-stocked crates of carcasses twice a week to the nearest market brought in a very comfortable living. No wonder that the rabbit had fewer enemies on his first establishment in districts in the sixties and seventies than friends. But there was trouble in store, for by-and-by it began to dawn upon the authorities that these busy little quadrupeds were becoming rather over ubiquitous and might possibly develop into something like a nuisance, so in the year 1880 the first Rabbit Act was brought into force. The Government was a long time, however, in getting things under weigh, and it was not till 1884-5 that it became thoroughly aroused. The increase had in the meantime become so alarming as to make active measures imperative, and the work of suppression was at last set about in earnest. The first year's effort in this direction, though no doubt appearing considerable in those days, was a comparatively small one, the outlay amounting to only £1,284. As the years went on the expenditure increased (and so did the rabbits), the sum spent during 1885-6 being £24,833, and by the end of 1888-9 the cost of destroying and fencing had reached almost £170,000.

That the purpose of the expenditure was far from accomplished, however, is shown by the fact that a few years later 10,000,000 rabbit skins were exported from Victoria in one season, and the following year 118,000 carcasses were sold in the Melbourne markets.

The over-running of Victoria was soon followed by the infestation of South Australia, and that colony also found herself forced to take active measures to meet the invasion. The fight proved a formidable one. From January, 1884, to December, 1888, a little more than £502,000 of public money was spent in trying to overcome the enemy. Although New South Wales began with the modest outlay of £490 in her first year (1883), by the time she had reached the end of 1889 she had paid away—as the result of Mr. Thomas Austin's acclimatization proclivities 30 years previously—considerable more than one million pounds.



PATERSON'S CURSE (*Echium plantagineum*, Linn.)

A.—Plant.

B.—Inflorescence and leaf.

C.—Flower and section of same (enlarged).

D.—Fruit (enlarged).

PATERSON'S CURSE.

(*Echium plantagineum*, Linn.).

W. M. CARNE, F.L.S., and C. A. GARDNER.

Paterson's Curse is an annual or biennial herb now fairly well established in some parts of Western Australia. Its native home is the Mediterranean region and Western Europe, where it is known to the British as Viper's Bugloss, and is cultivated to some extent in gardens.

The earliest known record of its introduction into Australia is near Albury, in New South Wales, where it was grown as a garden plant. Spreading from here into a stock reserve, it became gradually distributed over many districts in the Eastern States, where it is now common.

Paterson's Curse is known in South Australia as "Salvation Jane" or "Blueweed." The name "Paterson's Curse" is after a certain Paterson, from whose garden it is supposed to have spread.

Its history in Western Australia is connected with the construction of the Great Southern Railway. Lady Campbell, wife of Sir Thomas Campbell, who was residing at the time not far from Broomehill, introduced this species as a garden plant, and from here it has become widespread, and is still known along parts of the Great Southern Railway as "Lady Campbell weed."

The name *Echium* is from the Greek *Echis*, meaning viper: hence the name of Viper's Bugloss. *Plantagineum* is from the resemblance of the leaves to *Plantago*, the Plantain.

Paterson's Curse has been reported in this State from various places along the Great Southern Railway; Donnybrook, Brookhampton, and Bridgetown in the South-West; Wooroloo, Swan View, Darlington, and Guildford, and from Gingin and Mingenew. It has not been officially recorded from the Eastern districts.

Around Broomehill and Kojonup it occurs very extensively in the paddocks, often covering large areas, and the same has been said of the plant in the Blackwood district. Further north it is more sporadic, but there is always the possibility of its spreading, and if unchecked may become very common.

Description of Plant.—An annual or biennial herb of usually 1 to 2½ feet, rarely 3 to 5 feet high, branching at the base with several erect stems, stout and hairy. Leaves mostly basal, the basal large and oval-lance-shaped, stalked, the upper leaves smaller, without stalks and heart-shaped at the base. Flowers reddish-purple, in long curved racemes: each flower subtended by a leaf-like bract. Calyx deeply divided into five acute lobes: hairy with stiff white hairs. Corolla tubular, bell-shaped, about three times as long as the green calyx. The fruit consists of four small wrinkled nuts, which fall out of the base of the persistent calyx. The flowering season is September to November: the plants seeding about the same time, or into December.

Paterson's Curse germinates and stools out in winter, and sends up its flower-bearing stems in the spring. The plants make their best development in fairly rich soils. The weed only occurs at present in the areas of higher rainfall: it does not appear to withstand the dry conditions of the Eastern districts.

There are two objectionable features of Paterson's Curse. In cereal crops it is particularly troublesome in crowding out the growing crops, and interfering with harvesting operations. In pasture lands it crowds out more valuable annual pasture crops and considerably reduces the dry feed value of the pasture. It is not likely to prove as troublesome in good permanent pasture land, since the more vigorous grasses, such as Couch and Paspalum, are able to compete with it, or even crowd it out.

Paterson's Curse has some value as a fodder plant, but it must be emphasised that this quality is not one to make the plant a particularly desirable one. The plants are eaten by stock when young. Where feed is scarce, it may be quite useful, providing a succulent spring feed. The mature plants, however, are fibrous, and harsh, and usually avoided by stock. Stock, however, will eat it if reduced to that extremity, but there is always a risk of the animals having digestive trouble. The weed has certainly received some praise from the drier areas of other States, hence the name of "Salvation Jane." Since these conditions do not obtain in our South-Western districts it is scarcely necessary to speak well of the weed on this account, and it should always be remembered that if other feed will grow, Paterson's Curse is not a very desirable plant.

Control.—The most effective control is heavy stocking by sheep. Where this is not possible hand pulling or hoeing in small areas, or cultivation in the larger ones, should prove effective. It is important to carry out these operations before the flowering commences, as the plants may, and often frequently, carry flowers and ripe fruits on the same branch. The flowers also may continue to develop on the uprooted plants. The weed burns badly when dry.



FRUIT FLY.

Ceratitis capitata (Weid.).

L. J. NEWMAN, F.E.S.,
Entomologist.

This serious fruit pest has made its appearance over a wide area, and gives evidence of being particularly plentiful during this fruit season. Owing to the dryness and mildness of the past winter and spring, there has been a more plentiful carry-over of the fly from autumn to early summer. This, coupled with the heavy crop of early stone fruits, paves the way for a rapid increase of the pest unless combined action is taken to combat same.

It is well that all growers should understand, whether they have one fruit tree or 1,000, that foliage baiting is now compulsory. Any grower whose fruit is found infested with the larva or maggot of the Fruit Fly is liable to prosecution, the maximum penalty being £25.

Not only must the trees be baited with an approved bait, but all fallen infested fruits must be picked up and destroyed by boiling, once every 24 hours. If possible do not allow infested fruit to lie in the hot sun, as this induces the maggots to leave and bury themselves in the soil before the fruit is picked up.

Growers forwarding maggot-infested fruits to markets, or exposing, or offering same for sale, are liable to its seizure and prosecution. The Department relies on growers notifying it when neglect on the part of any owner to do all possible to check the increase and spread of the pest is observed. It is only by the combined efforts of all that this virile insect can be controlled, and those growers who will not voluntarily do their part must be made to do so by law.

The new Regulations as issued in the *Government Gazette*, are as follows:—

1. Fruit Fly (*Ceratitis capitata*) is hereby declared to be a disease to which the provisions of Section 8a of the Plant Diseases Act, 1914-1925, apply.

2. In every orchard where Fruit Fly exists the occupier shall cause—
(a) all fallen fruits to be gathered from the ground at least once in every twenty-four hours; (b) all fruits infested with larvae of Fruit Fly to be gathered from the ground and trees once in every twenty-four hours, and destroyed by boiling; (c) Fruit Fly bait, made in accordance with the formula hereinafter set out, to be applied in the manner prescribed in Regulation 4, once in every seven days, to all trees having fruits thereon, as long as such fruits are in a state of growth and ripeness which would enable Fruit Fly to use such fruits as a depository for eggs.

3. The formula for making Fruit Fly bait is as follows:—

5ozs. paste arsenate of lead, or 2½ozs. dry arsenate of lead.

4lbs. molasses.

1 gallon fruit syrup (orange for preference).

3 gallons of water.

4. Fruit Fly bait shall be applied to the trees with a hand syringe or small spray pump, using not less than one gallon of bait to 80 trees.

An illustrated Bulletin containing the life-history, and remedial measures is obtainable from the Department of Agriculture on application.

HERD TESTING.

THE OFFICIAL AUSTRALIAN PURE BREED DAIRY CATTLE PRODUCTION SCHEME.

Conducted by Dairy Branch, Department of Agriculture, Western Australia—Results since July 1st, 1925.

Name of Cow.	Owner.	Breed.	Herd Book No.	Age.	Date of Calving.	No. of Days in Test.	Weight of Milk for Test. Period.	Total Butter Fat.	Weight of Milk last day of Test.
MATURE COWS—5 YEARS AND OVER—STANDARD REQUIRED, 350LBS. BUTTER FAT.									
Treasure III. of Homelieh	...	I.M.S.	...	4,648	9-1-25	273	9,924	4.88	484.99
Gentle of Blackheath	...	M.S.	...	11,679	5 0	273	9,903	4.49	23
Cheerful II. of Yarrrala	...	Jersey	...	6,258	8 8	273	9,903	4.49	11
Mermaid of Blackheath	...	M.S.	...	12,156	5 2	273	6,658	5.49	365.67
Lotus Queen of Wongamine	...	Jersey	...	10,064	6 1	20-6-25	7,212	4.38	19 $\frac{1}{2}$
Mokane Lady Noble	...	Walker & Co.	...	10,633	4 8	2-11-24	273	6,361	5.61
COWS (OVER 4½ YEARS AND UNDER 5 YEARS)—STANDARD REQUIRED, 325LBS. BUTTER FAT.									
Sheila of Sarnia	...	Jersey	...	8,452	4 3	10-1-25	273	6,535	6.20
Velvet of Wollongbar	...	Guernsey	...	774	4 5	25-10-24	273	6,986	4.57
Pet VIII. of Glenview	...	D. Malcolm	I.M.S.	4,647	3 8	3-1-25	273	4,848	5.06
SENIOR HEIFERS (OVER 2½ YEARS AND UNDER 3 YEARS)—STANDARD REQUIRED, 275LBS. BUTTER FAT.									
Countess VII. of Berry	R. Smith	M.S.	N.Y.A.	2 10	6-1-25	273	6,078	4.05	246.34
Blue Bell II. of Cowra	R. Smith	M.S.	N.Y.A.	2 9	13-12-24	273	5,890	4.21	239.56
Primula II. of Berry	do.	do.	do.	2 6	14-12-24	273	4,615	4.47	206.61

JUNIOR HEIFERS (UNDER 2½ YEARS)—STANDARD REQUIRED, 200LBS. BUTTER FAT.

Robinson Girl IX.	of Berry	M.S.	2	5	N.Y.A.	2	5	4.11	331.40
lose of Waterside		... Wooroloo Sanatorium	... do.	3	9-11-24	273	6,131	4.58	281.38
lytle of Coura	...	... R. Smith	... do.	0	27-12-24	273	6,300	4.46	274.64
butterfly of Waterside	...	... Wooroloo Sanatorium	... do.	2	3-11-24	273	6,141	4.43	272.23
Sommet II. of Berry	...	... R. Smith	... do.	2	22-12-24	273	5,640	4.79	270.69
Polly II. of Coura	...	... H. Rose	... do.	2	1-1-25	273	5,675	4.55	258.31
Daisy Rye of Grass Vale	...	... Wooroloo Sanatorium	... D. Malcolm	5	23-10-24	273	3,741	5.51	206.15
treasure of Waterside N.Y.A.	... do.	1	24-12-24	273	3,510	4.53	155.14
Treasure of Sarnia I.M.S.	2	4	30-1-25	273	3,826	4.13	158.20

365 DAYS' TEST.

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APPLE SCALD.

GEO. W. WICKENS,
Officer in Charge Fruit Industry.

One of the best commercial varieties of late apples grown in Western Australia—"Granny Smith"—is particularly liable to develop "Scald" in cold storage, and for the purpose of testing prepared wrappers to control the trouble I obtained from Mr. Mauger, of the Westralian Farmers, Perth, two kinds, one put up by the "Kalamazoo Vegetable Parchment Co., Michigan, U.S.A., known as "Anti-scald apple wrapper," and the other also an American production known as "Coronite Mineral Oil Fruit Wrapper."

I obtained the apples from T. Price, of the Illawarra Orchard Co., Karragullen, and as they were grown in one orchard there were no variations in soil or climatic conditions to cloud the results.

My experience shows that well matured, but not over-ripe apples, develop scald in a much less degree than apples which are stored in a green or immature condition, and those which I used in this test were in the correct stage of ripeness for storage when placed in the Government Cold Store in Perth on 6th June last.

Four cases of "Granny Smith" apples were used and kept at an average temperature of 33 deg.—

No. 1 was wrapped in "Anti-scald" paper.

No. 2 was wrapped in "Coronite" paper.

No. 3 was wrapped in Sulphite tissue paper (ordinary apple wrapper).

No. 4 was unwrapped.

The fruit was taken out of cold store and examined on 1st October, five days short of four months from the date of storage.

The only difference noticeable when the apples were unwrapped was a slightly more attractive appearance in those from case No. 1: the fruits in this instance being more yellow and with a greater degree of natural wax showing on the skins than was apparent on those from Nos. 2, 3, and 4.

No trace of "scald" was to be seen on any of the fruits at the time they were taken from the cases and unwrapped, but within 24 hours those from No. 4 commenced to develop it, and a day later those from No. 3 followed suit, though in a much less degree. Each succeeding day an increase in the affected area on the apples from Nos. 3 and 4 was manifested, but those from Nos. 1 and 2 ripened naturally with hardly a trace of the trouble.

On 10th October, which was the tenth day after the apples were removed from cold store, I examined every apple in the four lots and noted the following results:—

No. 1—130 apples, only 6 of which were very slightly affected with scald.

No. 2—120 apples, only 9 of which were very slightly affected with scald.

No. 3—106 apples, 53 of which were affected with scald; many of them badly.

No. 4—106 apples, 100 affected with scald; majority so badly damaged in appearance as to be unsaleable.

An interesting feature in this test, and one I had not previously noticed, was the number of apples in Nos. 3 and 4 that showed "scald" around the calyx, giving the fruits so affected the same outward appearance as "Cleopatras" have when affected with Mouldy Core.

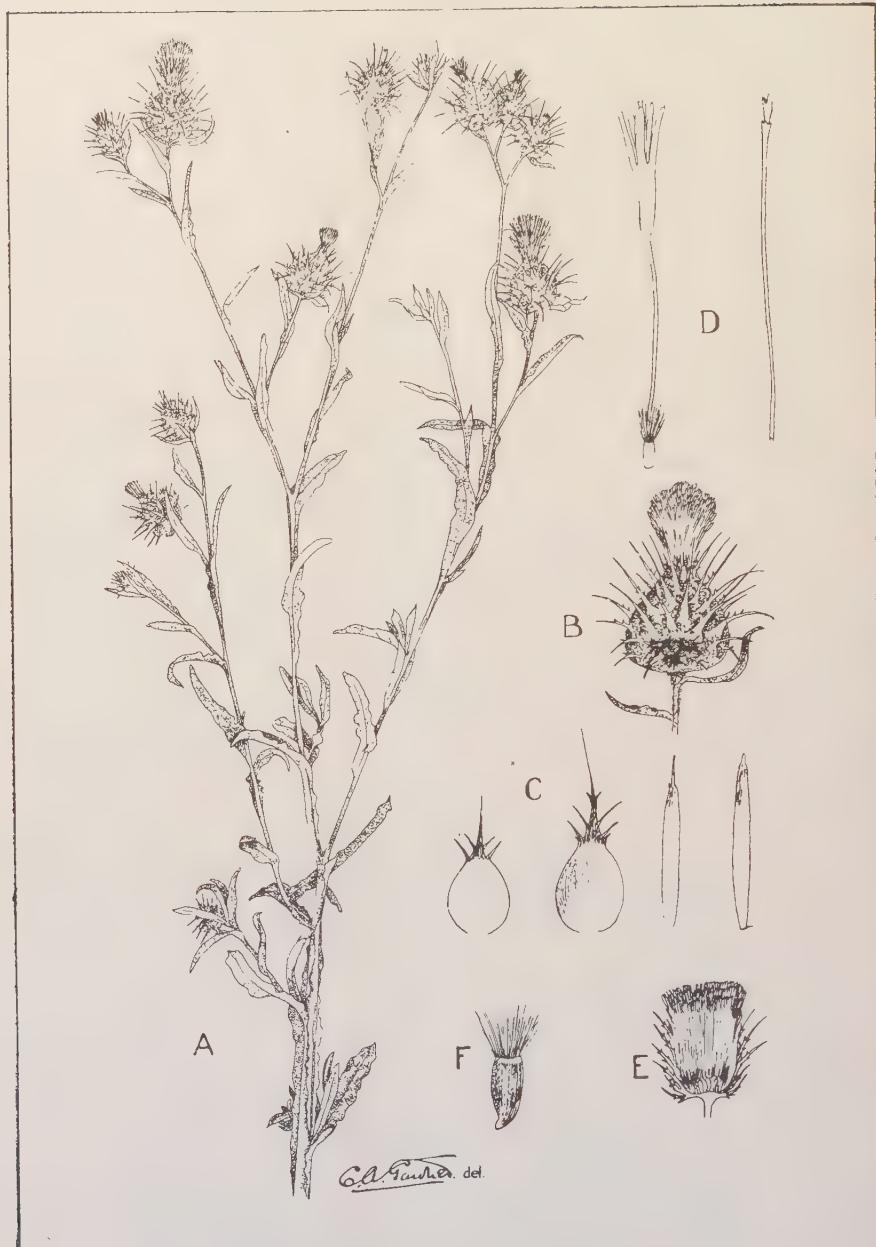
I kept 12 apples out of each of the lots 1, 2 and 3 wrapped until the 10th day to note if the paper after removal from store would, if left on the apples, retard the development of "scald." The results, however, were inconclusive, for although none developed in those kept from 1 and 2, the percentage showing in the unwrapped fruits from the same cases was so small, and the affection so slight, that no appreciable advantage was proved in leaving the fruit in the wrappers.

Of the 12 apples from No. 3 allowed to remain in the wrapping paper, 9 developed "scald," every one of these being affected around the calyx and most of them on other parts as well.

It will be noted that in the tests I made the paper used was an American production which was all I was able to obtain at the time, but since then I have had samples of oiled wraps from Messrs. Spicer & Detmold, Murray Street, Perth, which are prepared by the firm mentioned, and which I intend to use in making further tests next season.

To summarise.—The tests, though made with only a small quantity of apples, goes to prove that oiled wrappers will prevent "Granny Smith" apples from developing scald following on cold storage, and that it is a mistake to keep the variety named in cold store until late in the season either wrapped in sulphite tissue paper or unwrapped.



COCKSPUR THISTLE (*Centaurea melitensis*, Linn.)

- A.—Plant.
- B.—Flower-head (capitulum).
- C.—Bracts of the involucre (enlarged).
- D.—Single floret and pistel (enlarged).
- E.—Section of flower-head.
- F.—Fruit (achene), enlarged.

COCKSPUR THISTLE.

Centaurea melitensis (Linn).

W. M. CARNE, F.L.S., and C. A. GARDNER.

Cockspur is an annual yellow-flowered thistle, now widely dispersed throughout the South-West and agricultural areas of Western Australia, but it is not a proclaimed noxious weed for any part of the State. Like other thistles, Cockspur is a member of the Daisy family, and its seeds, produced in large numbers, are chiefly distributed by the wind.

The generic name—*Centaurea*—is after Cheiron, one of the Centaurs of Greek legend, who is said to have used this plant and another to cure a wound in his foot, received from one of the arrows of Hercules. He died of the wound, however, bestowing his immortality upon Prometheus. The name *melitensis* means “of Malta,” this species being a native to that country. On this account it is sometimes known as “Maltese Cockspur.”

The range of Cockspur in Western Australia is very wide, extending from the South-West to the Victoria district, and Eastwards to the Eastern limits of the Wheat Belt. The date of its introduction is not known, but it has been naturalised here for a considerable period.

Like many of our other weeds, Cockspur has a certain value as a fodder plant, but this value is very limited. It is eaten by stock in the summer when other feed is scarce; the heads especially are the parts most frequently eaten by sheep. In crops, however, it must be regarded as a weed, but it rarely interferes with grain crops, as it is usually over-grown by the crops. In hay crops, however, it is more serious, since it reduces the value of the chaff, the bitter flavour and the spines which irritate the softer mouth parts making it disagreeable to stock. These spines also render the handling of the hay unpleasant.

Farmers usually regard this plant as more useful than harmful, but this is undoubtedly due to the difficulties attending its eradication. The seeds, which are produced freely are, in addition to being distributed by the wind, scattered by means of stock eating the plant in seed, or through chaff.

When there is no shortage of natural feed in the summer, Cockspur must be regarded as a weed with no advantages. Its presence in cereal crops indicates low-grade farming, i.e., repeated cropping of the land, or unclean fallows.

Description of Plant.—An erect rigid annual, rather woolly on the stems and leaves. Stem leaves narrow, entire or almost so, continued down the stems below the insertion of the leaf as long narrow wings. Flower-heads terminating the branches, not stalked, egg-shaped. The receptacle has bristles between the florets. The bracts of the head have pinnately arranged lateral spines besides the long terminal one; the intermediate ones are the longest, and the inner ones have only one short terminal spine. Florets yellow, all tubular, the pappus bristly, of simple scale-like bristles.

Three species of *Centaurea* are recorded in Western Australia, and may be distinguished as follows:—

Flowers purple	...	...	...	...	...	...	...	C. calcitrapa.
Flowers yellow—								
Involucral bracts with a long spine and palmately-arranged spinules	...	...	...	...	...	...	...	C. solstitialis.
Involucral bracts with a short spine and pinnately-arranged spinules	...	...	...	...	...	...	...	C. melitensis.

Control.—The plant is so frequent in places not well controlled, such as roadsides and waste lands, that there is always a possibility of its invading adjacent farms. Systematic farming, with the practice of weed-clean fallows, and the running of sheep on young growth in the fallows will probably keep it in check. When chaff is purchased it should be free from Cockspur, otherwise stock will distribute it.

THE PLANT DISEASES ACT, 1914.

The Plant Diseases Act of 1914 represents one of those measures which, at some time or other, is necessary to be thrown over an industry for its preservation. It was first introduced into Parliament in 1913 as an amendment to the Insect Pests Act, but did not succeed in getting past the Upper Chamber. In the following year, however, it was again introduced with amendments submitted by the executive council of the Fruit Growers' Association, when it became law. It had, therefore, the benediction of all parties to its creation, and while it confers comprehensive powers on those whose duty it is to administer them, they were the recognised necessity by those who sought to suppress and control any plant diseases immediately it made its appearance in this State, or better still, to prevent its importation. For this latter purpose the Act gives power to prohibit the introduction into the State of anything infected with disease, and ports of entry may be proclaimed as quarantine stations and officers appointed to enforce compliance with the provisions of the Act. It is well for the orchardist to bear in mind that within twenty-four hours of his becoming aware of the presence of such a disease he must give written notice to the inspector, and that this duty devolves upon the occupier of any land used for the purpose of growing or cultivating plants, whether it be a garden, farm, vineyard, vineyard or hothouse, and in fact any place where a plant is or has been cultivated and grown. By an amendment, which was introduced during the 1924 session of Parliament, it is also obligatory upon the occupier, upon becoming aware of the disease, to adopt such measures as are prescribed for its eradication and for preventing its spread. He must also permit any inspector to examine his orchard and premises, and should the inspector discover disease

the owner and occupier must comply with his instructions as regards combatting it. For this purpose the inspector is empowered to examine fruits, plants, coverings, goods and other things, and may even dig up plants and open packages. He may also stipulate a time limit for the commencement and completion of the work of eradication, and both the owner of the premises and the occupier are responsible for compliance with his requests.

Should the owner or occupier fail to comply with his instructions, then the inspector may do the work or have it done, and recover the expense from either the owner or the person in charge.

The inspector has also power to board any vessel for the conveyance of fruit; he may examine any structure used for its storage, and do all such things as he deems necessary in the discharge of his duties.

On a report that disease exists, the Minister may declare an orchard and land contiguous to it as an infected area, from which no plants may be removed without the inspector's permission.

In addition to destroying plants that are affected an order to destroy prunings may be made, but in this respect it is possible to obtain a certificate of exemption in regard to prunings required for propagation purposes.

Another point is that, although land held *may not be affected* by a disease, for the purpose of preventing contagion the inspector may order the orchardist to take such measures as he may think necessary. Young plants are not to be grown near trees in bearing, if intended for sale and, so that this provision can be safeguarded, power is given to interrogate the vendors of fruits and plants.

Again, the destruction of abandoned orchards may be authorised, and it is well to remember that an abandoned orchard is one that has been habitually neglected or for a long period left uncultivated.

If, despite all precautionary measures taken, prohibited plants should find their way into the State, or if any attempt be made to introduce or export such plants, the officers appointed for the administration of the Act are empowered to seize them.

Another feature of the Act is that where work has to be done in fighting disease, if it is necessary owing to the negligence of the occupier, the owner can recover expenditure incurred from the person in charge. On the other hand, if the expenditure is brought about through the fault of the owner, and not the person who is occupying the land, then the latter has a like right of remedy against the owner, subject, of course, to any agreements that may exist between them on the question of tenancy. To facilitate the work of suppression and prevention, right of entry is conferred on both the owner and occupier of an orchard, etc.

Such are the main features of the Act, which gives the customary power for the making of regulations, and under which penalties ranging from five to one hundred pounds may be imposed for breach and default.

THE WORLD'S WHEAT SUPPLIES AND REQUIREMENTS.

(From 1st August, 1925, to 31st July, 1926.*)

The International Institute of Agriculture, Rome, through its Bureau of General Statistics, publishes some interesting information concerning the World's Wheat Supplies and Requirements, which is hereunder set forth for the benefit of our readers. The article is taken from the October issue of this year of the International Crop Report and Agricultural Statistics.—[ED.]

I.—EXPORTABLE SURPLUS.

The statistical information at our disposal is sufficient for an estimate of the quantity of wheat that should be available for export, at the beginning of August last, from the most noteworthy of the exporting countries. On the basis of this information, the quantities available for export at the opening of the commercial season, 1st August, 1925, to 31st July, 1926, were, from Canada 175 million centals, from the United States 41½ million, from India 1½ million, from Argentine 26½ million, and from Australia 7 million centals. (See Table I.)

As regards other exporters the bases required for estimates are less trustworthy. The Balkan and Danubian countries (Roumania, Bulgaria, the Serb-Croat-Slovene State, Hungary), Algeria and Tunis have reaped harvests surpassing their individual requirements; but the quantity which these countries are in a position to export during the season 1925-26 can only be somewhat roughly estimated, since no data of their stocks on hand are in existence, while their *apparent consumption* (on the basis of production and of international trade) has afforded very variable arithmetical results, and thus becomes a very doubtful basis for estimating their probable requirements of wheat during the current season. The available information tends to the conclusion that the aggregate exportable surplus in the countries mentioned is about 44 million centals (Roumania about 13 million, Bulgaria 4 million, Serb-Croat-Slovene State 9 million, Hungary 9 million, Algeria, Tunis and other minor exporters outside of Europe 9 million centals).

Still greater uncertainty enshrouds the possible exports of the Soviet Union. The wheat harvest in those territories is decidedly larger than that of the previous year, and, according to official estimates furnished to the Institute, surpasses it by about 170 million centals. An estimate published in a Soviet Official Review places the quantity of wheat exportable during the season 1925-26 at 73 million centals. Bad weather during harvest and more recently should reduce these forecasts of quantity, while the quality must also have suffered. Taking into account the special circumstances of grain trading in the Soviet Union, it seems prudent to confine the probable export figures to a quantity which may vary between 22 million and 44 million centals.

In the aggregate, the quantity of wheat available for export at the beginning of August last, should therefore be about 330 million centals.

TABLE I.—WHEAT (GRAIN AND FLOUR REDUCED TO EQUIVALENT IN GRAIN).
Quantities Exportable on 1st August, 1925.
(Million Centals.)

Countries.	Total quantities available at the opening of the current season. †			Estimated consumption during the current season. †	Quantities available for export at the opening of the current season. †	Exports from the beginning of the current season until 31st July, 1925.	Quantities available for export on 1st August 1925.
	Yield in the crop-year: <i>Northern Hemisphere</i> 1925, <i>Southern Hemisphere</i> current season, 1924-25.	Exportable stocks on hand at the opening of the current season. †	Totals.				
Canada ...	235.1	10.0	245.1	70.0	175.1	...	175.1
United States ...	418.4	24.0	442.4	396.0	46.4	4.8	41.6
India ...	194.8	9.0	203.8	193.4	5.4	3.9	1.5
Argentina ...	114.7	6.2	120.9	40.8	80.1	53.4	26.7
Australia ...	96.8	...	96.8	27.0	69.8	62.6	7.2
Total ...	1,059.8	49.2	1,109.0	732.2	36.8	124.7	252.1

† The current season is defined as follows:—From 1st August, 1925, to 31st July, 1926, for Canada; from 1st July, 1925, to 30th June, 1926, for the United States; from 1st April, 1925, to 31st March, 1926, for India; from 1st January to 31st December, 1925, for Argentina and Australia.

This quantity will be supplemented at the beginning of 1926 by the exportable surplus of the new southern hemisphere crops, now making progress towards ripening. In Argentina a larger area has been sown, and the crop prospects are, at present, favourable. In Australia the area under wheat is not quite as great as in 1924, and the crop condition, despite insufficient September rainfall, was still fair at the beginning of October, though further rains are needed if good yields are to result. At present it may be expected that the aggregate of these two southern crops should reach the same figure of 210 million centals as that secured last season; so that, after providing for their own requirements, Argentina and Australia may be in a position to export 140 million centals from their new crops.

From the foregoing estimates it follows that the quantity of wheat theoretically at the disposal of the importing countries during the commercial season, 1st August, 1925, to 31st July, 1926, will amount in the aggregate to about 470 million centals.

II.—REQUIREMENTS OF IMPORTING COUNTRIES.

Some indication of the possible requirements of the importing countries during the commercial season, 1925-26, though merely approximate, may be gathered from Table II. Here are set forth, as regards most of the importing countries, in the first place, their production, imports and apparent consumption during the last three seasons, and on the other hand their production in 1925.

The plentiful harvests of wheat (and of rye also) gathered in these countries render it certain that their import requirements must be reduced this season. If their consumption in 1925-26 is to be limited to the figures of apparent consumption during the season 1924-25 an import of about 265 million centals would suffice. The experiences of previous seasons, however, go to show that, during seasons of plenty, imports do not necessarily decline proportionately to the increased home production. The replenishment of stocks, so generally reduced after a poor harvest such as that of 1924, and the inclination to consume more in a season of plenty, are doubtless con-

tributary causes in such instances. It is therefore estimated that the probable imports into those countries which are taken separately in Table II., between 1st August, 1925, and 31st July, 1926, will be 310 million centals. The requirements of other importing countries must now be added, require-

TABLE II.—WHEAT (GRAIN AND FLOUR REDUCED TO EQUIVALENT IN GRAIN).

The Apparent Consumption of Importing Countries in the seasons from August 1, 1922, to July 31, 1923, August 1, 1923, to July 31, 1924, and August 1, 1924, to July 31, 1925, compared with the Production of Wheat in 1925.

(Million Centals.)

Countries.	Production in 1922.	Im- ports 1922-23	Appar- ent Con- sumption 1922-23.	Pro- duction in 1923.	Im- ports 1923-24	Appar- ent Con- sumption 1923-24.	Pro- duction in 1924.	Im- ports 1924-25	Appar- ent Con- sumption 1924-25.	Pro- duc- tion in 1925.
Germany	... 43.2	22.5	65.7	63.9	17.7	81.6	53.5	47.5	101.0	64.0
Austria	... 4.5	7.5	12.0	5.3	13.7	19.0	5.1	b 9.3	14.4	7.1
Belgium	... 6.4	23.8	30.2	8.0	24.1	32.1	7.8	b 23.2	31.0	c 8.4
Denmark	... 5.5	3.5	9.0	5.3	5.4	10.7	3.5	3.9	7.4	c 4.9
Estonia	... 0.4	0.7	1.1	0.4	0.6	1.0	0.3	0.5	0.8	0.3
Finland	... 0.4	2.9	[3.3	0.4	3.1	3.5	0.5	2.6	3.1	0.4
France	... 146.0	27.8	173.3	165.3	32.1	197.4	168.7	18.3	187.0	197.4
Gr. Britain and Ireland ^d	39.9	b 126.8	166.2	36.3	b 143.4	179.7	32.2	136.1	168.3	b 31.0
Greece	... 5.7	9.7	15.4	8.0	12.0	20.0	5.8	12.2	18.0	6.9
Italy ...	97.0	69.4	166.4	134.9	42.2	177.1	102.1	53.5	155.6	144.4
Latvia	... 0.6	0.7	1.3	1.0	1.1	2.1	0.9	1.2	2.1	1.2
Norway	... 0.4	4.0	4.4	0.4	3.5	3.9	0.3	3.2	3.5	0.3
Netherlands	... 3.6	14.1	17.7	3.7	15.8	19.5	2.8	15.9	18.7	3.1
Poland	... 25.5	1.3	26.8	29.8	1.5	31.3	19.5	9.6	29.1	35.1
Sweden	... 5.6	5.3	10.9	6.6	7.4	14.0	4.1	6.3	10.4	8.4
Switzerland	... a 2.1	9.9	12.0	a 3.8	10.3	13.6	a 2.8	8.3	11.1	a 3.2
Czecho-slovakia	20.2	6.0	26.2	21.7	12.1	33.8	19.3	12.1	31.4	21.9
Japan	... 16.6	8.2	24.8	17.0	17.4	34.4	15.2	7.4	22.8	16.5
Egypt	... 22.0	4.4	26.4	24.4	4.8	29.2	20.5	5.6	26.1	21.9
Totals	... 445.6	347.5	793.1	535.7	368.2	903.9	464.9	376.7	841.6	576.4
Other countries ^e	... 84.5	...	...	...	118.9	...	...	81.9	...	...

^a Inclusive of spelt and meslin.^b Partly estimated.
the Irish Free State.^c Estimate.^d Including

ments which were especially large in the season 1923-24 owing to particular circumstances, but may be taken ordinarily at about 80 million centals, with the anticipation of a like result for the current season.

Summarising thus, the total quantity likely to reach the importing countries during the season 1925-26 may be estimated at 390 million centals.

III.—CONCLUSIONS.

The balance sheet for the period between 1st August, 1925, and 31st July, 1926, therefore deals, on one hand, with an exportable surplus of wheat amounting to about 470 million centals, and, on the other, with the probable requirements of importing countries, forecasted at about 390 million centals. The result is that wheat supplies are more than sufficient to meet consumption requirements, and should leave a good margin in hand at the close of this season.

THE POTATO.

DIGGING THE CROP AND PREPARING IT FOR SALE.

G. N. LOWE,

Senior Potato Inspector.

Having followed carefully all the various necessary operations to secure a good crop, the question of harvesting it is a phase of the business which, unfortunately, has more often than not to be delegated to the tender mercies of the contract digger, particularly where the area is at all large.

The contract digger is most interested in filling the greatest number of bags per day, and not so concerned as to what remains in the ground, after, in numbers of cases, a more or less perfunctory "jab" with the fork at where the tubers ought to be. Consequently it is quite a common occurrence for the grower to find, after ploughing the paddock, anything up to a ton and a half per acre left behind and this, as can readily be imagined, may in some seasons represent the grower's profit.

In the South-Western areas at this particular season, when the grower is straining every nerve to get every possible ton away for export before the Potato Moth and heat cause trouble, the business of digging results in a great deal of anxiety, and the tendency is to put on as a digger anyone who can push a fork. It follows that the percentage of tubers injured and stabbed by such a digger is a great deal higher than ordinarily would be the case. Fork marked and cut potatoes are not desirable at any time or in any parcel of potatoes, but in export consignments they constitute a real danger to the successful carriage and appearance of the line at its destination.

All buyers, whether the housewife about to purchase groceries or the Sydney potato merchant at Sussex Street, are very largely influenced by the attractiveness of the goods submitted, and the potato grower generally does not realise what a close bearing the "get up" of even the prosaic potato has on the important question of its sale. Grading and uniformity generally, in size and shapeliness, enter into this side of the business very largely, whether the quantity of potatoes submitted be "round seed" or table size, either for local market or export.

Generally the stage at which to dig the winter-planted crop in the South-West is influenced by the market, and not the fitness of the tuber for table purposes, particularly earlier in the season when, naturally enough, the grower is after the high prices. Consequently the loss per acre in weight of the crop, comparing immature tubers with those even moderately ripe, is a very serious one, apart from the fact that unripe potatoes will not handle or carry successfully, and reach the end of their journey skinned, blackened, and generally unattractive looking. Such produce when arriving in the metropolitan markets has a disastrous effect on prices, and the spectacle is often presented of a fall of 30s. to £2 per day, not through over-supplies, but because of the extremely bad condition of the produce sent forward for sale.

This has, naturally, the effect of spoiling the market for consignments which come in a little later in good order, and to this may be ascribed largely the instability of the potato market for the South-West produce in the early summer.

Fortunately the Albany, Busselton, Hamel, and Benger crops grown through the summer do not suffer from this disability, and complaints are not heard of this produce as to lack of ripeness.

By all means harvest the seed immature, as this has a decidedly beneficial influence on the resultant crop; but table potatoes dug unripe are horrible things both to look at and to eat, after travelling long distances in bags and having been subjected to numerous handlings.

Although hand digging is most generally employed in this State, the machine does perfectly satisfactory work where the conditions of planting and cultivation are made suitable to its use, and a very great saving in harvesting costs follows. Obviously it is asking for trouble to expect a machine to successfully work a crop grown in land which abounds with stumps, roots, and stones, and it is just about as reasonable to expect a binder to operate well in a crop of saplings as to expect the machine digger to cope with such conditions.

Each of the machines on the market is designed to handle a "ridged" or "moulded" crop, and under these conditions does very nice work with proper attention given to the necessary adjustment as to depth and draught. Where the summer crop is grown under the "flat" or "unmoulded" system (and this is fairly general) the crop should be "ridged" just prior to digging to get over the difficulty. This loosening of the soil, moreover, considerably lightens the draught to the team.

One difficulty with machine digging, however, is that of securing labour for picking up, as men who are expert with the fork make better wages than can be obtained following the machine. The increasing costs of hand digging must soon compel the grower to use the machine for this work, particularly as correctly handled, the mechanical means of lifting the crop ensures cleaner digging than unskilled hand work, and far less injury to the tubers.

Undoubtedly in an area such as Benger Swamp, the machine will do its best work, as no roots or stumps need be feared, and the class of soil lends itself admirably to its use. In a district such as this, it appears that there is a very fine opening for an energetic man with machine diggers and the necessary staff to lift the crop at a price per bag, working on somewhat similar lines to the travelling shearing outfits operating in our sheep areas.

As the crop is dug the bags should be promptly sewn and carted out of the paddock, either to trucks or into the coolest, shadiest, place available in summer time, or into the shed at others. The foolish practice of placing haulms over the mouth of the bag is still noticeable, and certainly cannot be too strongly condemned, as undoubtedly this is a very definite source of disseminating the Potato Moth.

Finally, the grower who takes most trouble over grading and properly presenting his produce for market, has the least trouble in any season in disposing of his crop, and his stencil on the bags is usually sufficient to sell his offering at once.

LOCUSTS.

Chortoicetes terminifera (Walker).

L. J. NEWMAN, F.E.S.,
Entomologist.

During the past summer this destructive pest migrated into the Avon Valley areas. The unusual rains experienced throughout this area in February and March last resulted in the growth of a quantity of green feed in the stubble paddocks. The presence of this feed induced the locusts from the far inland areas to migrate following the feed. These appeared on the wing about March.

It is evident, by the presence of swarms of locusts experienced during the month of November, that this March swarm had found suitable egg-laying grounds, and had at least temporarily established themselves in this area. Fortunately the eggs laid in March did not hatch until October. The crops were then well advanced and did not suffer, and further, before the winged stage was reached in late November, the wheat was too dry for them to attack. The swarms which do so much damage to the crops arise from eggs laid in October; these give rise to young hoppers in August, which attack the growing crops. Later—in October—when winged, they have a very destructive habit of cutting off the wheat heads and thus causing great loss. They also eat up the natural feed. The November swarms are too late to injure the crops, but are most destructive to fruit trees, vines, lucerne, Soudan grass and any garden plants.

The appearance of these swarms is a serious matter, and demands the attention of all farmers and others interested. If they become permanently established in the areas now invaded, they may respond to the climatic conditions of their new environment, and appear as they do in the Eastern areas in August, and attack the growing crops.

With a view to their control, all concerned should make a special effort to note their egg-laying patches. These are generally bare, hard, and non-grassy ground. When located the egg-laden ground should be ploughed about $2\frac{1}{2}$ inches deep and well harrowed. This will expose the eggs to the elements, birds and predatory insects. If this is not possible the hatching out of the young hoppers in August or October should be noted, and as soon as observed immediate action should be taken to poison same. In the hopper stage they are found in close army formation and are easily dealt with, but once they obtain the wings, which is the adult stage, little can be done.

A great deal of experimental work has been done by the Entomological branch testing out various methods of combating this pest. It has been found that the young hoppers can be most effectively destroyed by spraying them with Arsenite or Arsenate of Soda. Formula—Arsenite or Arsenate of Soda, 1lb.; molasses, 4 lbs.; and water 16 gallons. This is thoroughly mixed and sprayed over the young hoppers, grass and weeds. It kills by direct contact, and by coating their food with poison. As they grow older and stronger the spray strength is increased by reducing the water from 16 gallons to 12

gallons. This cannot be applied to green crops, as it burns the foliage; grass and weeds treated will recover. No stock must be permitted to feed over areas so treated for at least a period of three weeks after final spraying.

The bait found to be most effective is made as follows:—

Bran—30 lbs.

Arsenite or Arsenate of Soda, or Paris Green—1 lb.

Molasses—4 lbs.

Sufficient water to mix into a stiff mash.

This bait is distributed broadcast amongst the hoppers in the very early morning. The locusts are day feeders, and consequently after their night's fasting they readily partake of the moist bait. If applied later in the day it dries up rapidly, and is not so tempting or effective. There is no question as to the efficacy of these treatments if carried out by all concerned.

I desire most earnestly to warn all growers that unless the oft-repeated measures for the suppression of this pest are thoroughly and co-operatively put into operation, the wheat areas will witness a severe plague of locusts. To deal with this pest at the present stage of infestation will prove much cheaper and easier than when the countryside becomes generally invaded.

ROOT CROPS.

A. G. FORRESTER,
Potato Inspector.

In the growing of root vegetables, as in other crops, the habit of growth is the main guide to cultivation. As roots are deep and gross feeders, the beds must be worked to a fine tilth to a considerable depth in order to allow them to descend freely.

It is advisable to prepare the beds some time before planting. If prepared by trenching in a heavy dressing of well rotted stable manure between nine inches and 18 inches deep, and a lighter dressing from nine inches deep to the surface, an intermediate crop may be sown with advantage. After the removal of the intermediate crop, the beds should be brought to a fine tilth to a depth of nine inches without adding a further supply of stable manure. The stable manure used forms a basis of available plant food, which may be added to from time to time by the use of artificial fertilisers, which will insure a rapid and unchecked growth.

Points to be remembered are:—A checked growth means badly formed, tough and unsatisfactory roots; a badly cultivated bed means badly formed, forked, split and unsightly roots; insufficient food means stunted and tough roots; and over-supply of food in the surface soil, six inches deep, means

many pronged or forked roots; a dry bed means no growth; a wet and cold bed means no growth; the soil should be well firmed round the roots, not left loose; the soil at all times should be friable, warm, moist and well drained.

Roots will grow on all soils provided that they are friable, warm, moist and well drained.

Beets.—There are two classes of beet, the long and the round. The latter does not require the depth of soil that the former does. When growing for early markets a rapid growth is essential; therefore, in addition to the basis of well-rotted stable manure, a series of additional dressings is advisable. Blood and bone, which supplies nitrogen and phosphoric acid, two of the essential plant foods, slowly for an extended period, should be applied at or just prior to sowing the seed. Sulphate of ammonia or nitrate of soda, which supplies nitrogen in a readily available form, should be applied frequently in small quantities at regular intervals; a handful to kerosene tin of water watered in every 10 days from the time the plants first show above the ground; care must be taken not to touch the plants when applying. In sandy soils a dressing of potash is necessary for rapid and successful growing. Sow small quantities of seed at regular intervals to insure a continuous supply.

Turnips.—Same as beet.

Carrots.—Same as beet, except that the top-dressing in early stages may be less or at longer intervals.

Parsnips.—Same as beet, but the cultivation must be deeper. A smaller supply of nitrogen is required, as too much tends to coarsen the texture. If left in the ground, or stored in a cool place for the winter, the quality is improved. A frost after maturity, and before digging, improves the quality and sweetness. Sow thickly, as the parsnip seed is a poor germinator.

Radish.—A hardy and rapid grower. As hot weather tends to develop a rank growth causing tough and stringy roots, a cool moist locality is desirable in summer.

Varieties.—The best guide as to the most desirable varieties is your next door neighbour; the next best is a reliable seedsman.

Always obtain fresh seed, as seed carried over from one season to another deteriorates in germinating quality.

Fertiliser.—A good utility mixture for use at sowing is:—Blood and bone, 7lbs.; superphosphate, 1lb.; potash, 2 lbs.; sulphate of ammonia, 2lbs., used at the rate of 12lbs. to the chain. For top-dressing, a handful of sulphate of ammonia to a kerosene tin of water.

Sowing.—Sow thinly in drills about half an inch below the surface, or on the surface, and cover with fine soil and roll. Have drills about six inches apart. Thin out in drills when plants are about two inches above the ground to three or four inches; at all times keep weeds down, as they rob the plants of their food; headlands and borderlands should at all times be kept clear of weeds, as they form a harbour for insect pests. Drains, if used, should be kept clean and free running, otherwise the beds become water-logged and cold.

Cultivation is the method of making plant food in the soil available for the plant.

VITICULTURAL NOTES.

H. K. JOHNS,
Viticulturist.

JANUARY AND FEBRUARY.

The weather right through the season has been usually temperate, and to date very favourable to the setting and development of the grape. The health and general condition of the vines is better than it was this time last year, and vine diseases are less virulent. As these notes are written towards the end of November, weather conditions may be, during the next two months, of a nature that will bring about a recurrence of Oidium. I find that nearly all commercial growers have already safeguarded their vines by repeated applications of sulphur. In the event of rain and humid weather conditions following, applications of Flowers of Sulphur to be made. Sulphur, to be effective, must be placed in close contact with the affected part of the vine. The portion that falls on the ground is too diffuse to be effective. Applications of dry sulphur are best applied in the early morning when the dew is on the vine, or as the weather is clearing after rain, and should not be made on hot, bright days, as injury to foliage and fruit will result. Sulphuring of wine grapes should be discontinued when they are nearing the ripening stage.

Cultivation should be carried out in a thorough manner at least once in every three weeks to conserve the moisture, and should always be done immediately after rain. In the case of a newly-planted vineyard, the young vines should be gone through, and where there are any suffering from dryness, with hard soil round, or weeds growing near, they should at once be worked round. If young vines show signs of stressing, a good can of water should be included in the foregoing treatment. There is no trouble equal to that of failure, and this applies with special meaning to the vine culture. If an extra dry season continues, the grower will do well to try and meet the emergency by extra diligence in the way of cultivation, and hand attention to young vines.

A vine that gets a good start in the first growing season benefits thereby for the remainder of its existence. The foliage of the vine is the truest indication of the state of health. If this be rich green and glossy, the vine is thriving: if withering, it is probably suffering from want of moisture. Should the foliage have a yellowish tinge it needs both feed and water, although the latter condition may arise on account of the roots developing trouble which prevents them from performing their normal functions.

FEBRUARY AND MARCH.

Cellar.—Early opportunity during these months should be taken to overhaul all machinery, and all utensils should be carefully cleansed. Let cleanliness be your motto in every branch.

All manipulation of the wines should be conducted with strict attention to cleanliness. Cleanliness in this case means not only the absence of dirt, but the prevention of moulds and bacteria. All surfaces with which the wine comes in contact should be thoroughly cleaned and washed immediately after use. Racking of old wines should be completed by the end of February so as to avoid handling during wine making.

One ounce bi-sulphate of potash or a couple of fluid ounces of bi-sulphite of soda solution to each bucket of water will help to sweeten tubs, hoses, presses, etc., when washing.

VARIETIES OF APPLE TREES SUITABLE FOR COMMERCIAL ORCHARDS IN WESTERN AUSTRALIA.

GEO. W. WICKENS,
Officer in Charge Fruit Industry.

Fortunately Western Australian apple orchards, which are practically in their infancy, when compared with the old established places in the Eastern States, have benefited to some extent from the knowledge gained of mistakes made in the varieties chosen for planting during the early period of the fruit industry in Australia, and many varieties now obsolete, which are still to be found in orchards planted from 25 to 40 years ago, have never found space in Western Australia.

But in our plantations, 15 to 20 years of age, there are a number of unsuitable kinds which require to be worked over to up-to-date sorts, and some of the newer growers have a tendency, even at this late day, to plant varieties which have doubtful reputations as revenue producers, and to make a further mistake of carrying too many kinds even of those that are known to be good.

For a commercial apple orchard in Western Australia, no matter whether the size is 10 acres or 100 acres, six varieties are sufficient, and those I favour as being most suitable to the conditions obtaining in our principal apple growing districts are:—Jonathan, Cleopatra, Dunn's Favourite, Granny Smith, Yates, and Tasma.

With these, both the local and overseas markets can be supplied throughout the season with excellent quality fruit, and each variety named is known to be a good cropper. The first four are the main varieties for export to London and European markets, and the last two, which are somewhat late in ripening for regular shipments each season to the other side of the world, are suited to the Singapore and Java trade. With reference to these late sorts I have said "regular shipments," because there are seasons when the early English fruits are short or late in ripening, and then these can be profitably exported to London.

All six varieties are excellent for local market requirements, and I have not advised an earlier ripening kind than Jonathan because, although there are many of them, I know of none I would recommend for planting in a commercial orchard.

Jonathan does not usually realise as good a price on the London market as Cleopatra and Dunn's Favourite, but it is a payable export variety for all that; is a regular cropper, and while it is in season it practically monopolises the local market as a dessert apple. Although it appears to the uninitiated to ripen fit for shipment before Cleopatra, this is not so. Cleopatra is a better variety for the early boats than Jonathan, for the latter when picked in an immature condition never ripens properly, and has a most uninviting appearance.

Another thing to guard against in shipping Jonathans is to avoid sending them on late boats, unless they are what is known in the trade as "second" crops, which are products of late blooms, and are usually small, hard and of exceptionally high colour. The dates of ripening of the main

crop vary according to the climatic variations of the seasons, so no hard and fast date for picking can be given which would apply in every year; but, as a general rule, picking Jonathans for export should commence about the end of the first week in March and finish at the end of that month.

Cleopatras and Dunn's Favourite can be shipped in March and April; Granny Smith towards the end of April and May; Yates and Tasmas in May, and as long afterwards as the market can take them at a payable price.

Not all of the six varieties mentioned have the same robust growth. The best situations should be reserved for Yates and Jonathans, and as these are suitable for cross-pollination, they should be planted out alternately two rows of each. Yates needs hard pruning, and the fruit must also be thinned, or, as the tree ages, the apples will become so small as to be unmarketable. If a prospective planter feels he cannot depend upon having these two necessary operations carried out, then I strongly advise him to drop Yates from the list, and be content with Granny Smith and Tasma for late sorts.

I know in the above list I have omitted many varieties which are thought of most highly, both by growers and consumers; and when one considers there are not merely hundreds, but thousands, of varieties of apples in existence to select from, it would be strange indeed if there were not many excellent sorts amongst them.

But I am giving my own opinion that under Western Australian conditions the six mentioned will give the greatest satisfaction.

I can hear readers say:—"What about Delicious, Statesmen, Dougherty, Sturmer, Rokewood, Nickajack, Cox's, etc." Well, I can only reply I know these and many other good sorts very well indeed, and I make my choice after a long experience and close observation of apple growing in Western Australia. The only one in my list which has not had a long trial in this State is Tasma, but I have watched it now for eight years, and am satisfied it is good.

With reference to Cox's Orange Pippin, I am sorry that in spite of advice given by the officers of this Department for many years past to avoid planting the variety, there are still some of the newer growers who are attracted by the high prices obtained for it in England, and who are planting it in spite of warning.

It has never been a commercial success in this State. I doubt very much if it has in the Eastern States, but until just lately I understood it certainly was a commercially successful apple to grow in England. Apparently, however, even that is not correct, *vide* the following, taken from Sectional Volume, No. 4, page 69, published by the Ministry of Agriculture and Fisheries, England, dated 1921:—

"*Cox's Orange Pippin*.—A dessert apple of the best quality. Size, medium to small. Round, orange, shaded and striped with dull red. Carries well. A very unreliable cropper, and only a moderate grower of somewhat spreading habit. Should be grown as either bush or cordon on dwarfing stocks. Very subject to scab, mildew and canker, especially on heavy cold soils. Seems to succeed best on gravelly soils. As a commercial variety is a speculation."

THE ANNUAL BIRDSFOOT TREFOILS.

(*Lotus angustissimus* and *L. hispidus*.)

W. M. CARNE, F.L.S.; C. A. GARDNER and A. B. ADAMS.

Two annual birdsfoot trefoils have become established in the South-Western portion of the State.

Lotus hispidus is known in New Zealand and Eastern Australia as the Hairy Birdsfoot Trefoil or Boyd's Clover. *Lotus angustissimus*, or Slender Birdsfoot Trefoil, is known in this State as Manjimup Clover or Giblett's Grass. The use of the technical Latin names is advised. Local names vary in different districts and lead to confusion, especially when it is realised that seedsmen have usually to purchase their seed stocks in countries where these names are unknown. The seed of the two plants under consideration comes mainly from New Zealand. Both plants there grow together, and the seed is consequently a mixture of both species. Commercially both plants are regarded as the same and are sold under either name.

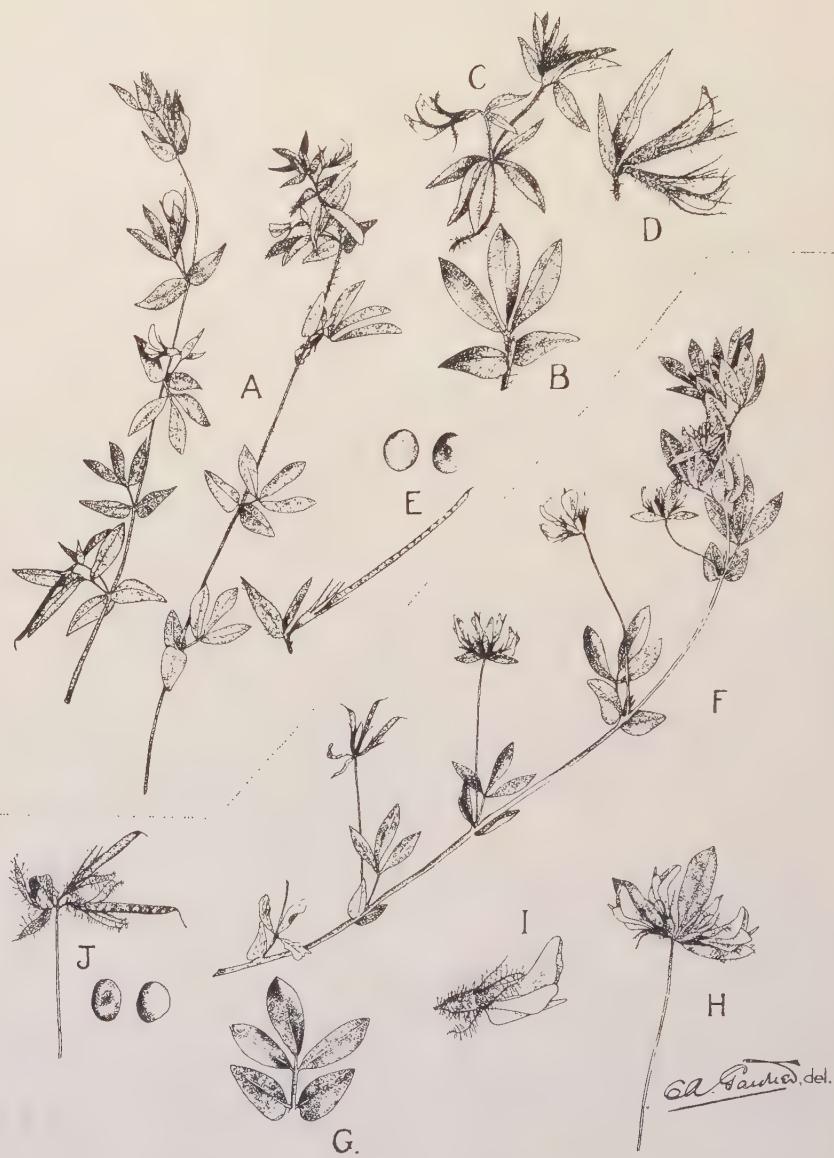
Lotus angustissimus is well established in the Manjimup area, and on the heavier soils in the Bunbury district, and as far East as Kulikup. It germinates with the first winter rains, but makes very little growth until the Spring. It is much later than Subterranean or other annual clovers, making rapid growth during November and remaining green until after Christmas when properly controlled. If allowed to run to seed without stocking, or if top-dressing with superphosphate is neglected, it will dry off much earlier. When well established and top-dressed it has a high stock carrying capacity, and a good reputation as a fattening feed. Unlike many of the legumes, it is not reputed to taint milk or cream.

For sowing on good swamps it is not recommended, though it will do well, because *Lotus major*, *L. corniculatus* and other perennial plants will usually give a better return. It is recommended for heavy wet land, which becomes dry in the summer. It prefers heavy soils such as clay, or iron-stone gravel. On loose dry sands it is not a success. Sown with Subterranean Clover it should do particularly well, as it comes into vigorous growth as the former goes to seed. Given early rains this mixture should give fair grazing in the winter, and a fattening paddock from the middle of September until Christmas or later.

Though eaten readily when young, stock do not appear to care for it when in flower, and this enables it to seed prolifically. When in seed, and dry, stock take to it again, and thus help to distribute the seed.

To establish this plant it should be sown fairly thickly, say, 3 lbs. to the acre, with a dressing of 2 ewt. of super. This area should be regarded as a seed patch, the seed being swept up when ripe and sown in other paddocks. The seed is very small and readily shed so that stock leave the greater proportion behind. Nevertheless they do help to spread it.

There is always a large proportion of seed which, though quite sound, is unable to germinate until the seed-coats have received some injury. These are known as hard seeds, and their germination is greatly increased by a fire. The grower must, therefore, be prepared for a poor germination the first season, but, given reasonable care, the proportion of plants present will increase annually, even very rapidly if a fire should go through the paddock. On bush country it should be sown after a burn.



Lotus angustissimus, Linn, and *Lotus hispidus*, Desf.

L. angustissimus (A—E):

- A.—Portion of stem.
- B.—Leaf.
- C.—Inflorescence.
- D.—Flowers.
- E.—Pod and seed (seed enlarged).

L. hispidus (F—J):

- F.—Portion of a stem.
- G.—Leaf.
- H.—Inflorescence.
- I.—Flower.
- J.—Pods and seed (seed enlarged).

Lotus angustissimus makes a most marked response to top-dressing. At Bunbury on a trial plot on good soil an area top-dressed at the rate of 2 cwt. of super. per acre yielded at the rate of 16 tons of green feed, or 4 tons dry per acre. It does well on uncultivated soil, which has been top-dressed after a fire, while on unmanured land it frequently grows only a few inches high.

Lotus hispidus resembles closely, and is often confused with, *L. angustissimus*. It is a stronger grower in suitable situations, with broader leaves. It is also later, and may keep green a month longer. So far it is not as widely distributed as *L. angustissimus*, though both may be found growing together. In treatment recommended and in other respects the two plants are similar.

It should be remembered that purchased seed is usually a mixture, with one or other of the two plants predominating.

The seeds of both are very small and run about 500,000 to the pound. Samples, however, invariably contain other seeds such as Flat Weed, Rib-grass, Hair-grass, Silver-grass, Yorkshire Fog and annual clovers, docks and sorrel, representing about 3 per cent. by weight. Of the sound seed we find the germination is about 30-40 per cent.; the hard seeds representing 40-50 per cent.

Description.—From the other herbaceous leguminous fodder plants *Lotus* may be distinguished as follows:—

The leaflets are five in number, the three uppermost spreading clover-like from a short stalk, the two lower ones (unequal-sided) at the base of the stalk, and resembling leafy stipules. The stamens are ten in number, the five alternate filaments being widened towards the anther. Only the upper stamen is free. The pod, which is cylindrical, is longer than the calyx, and has membranous partitions between the seeds.

There are four species of *Lotus* cultivated in Western Australia besides one indigenous one. The two *annual* species may be contrasted as follows:—

Peduncles short and slender, usually 2-flowered, pod 1-1 $\frac{1}{4}$ ins. long, seeds not speckled—*L. angustissimus*.

Peduncles rather long, flowers usually 3-4, pod 1 $\frac{1}{2}$ -3 $\frac{1}{4}$ ins. long, seeds speckled—*L. hispidus*.

Lotus angustissimus.

An annual prostrate or ascending herb with soft hairs on all its parts, especially around the flowers and young leaves; leaflets usually narrow, the two lowest ones broader and unequal-sided, the three uppermost on a short stalk. Flower stalks (peduncles) short and slender, usually 2-flowered, sometimes 3-flowered, the flowers pale yellow, the standard usually broader than long, fading to a greenish colour. Pod long and narrow, 1-1 $\frac{1}{4}$ ins. long. Seeds about 0.9 mm. long, almost rounded; the face slightly less convex than the edges; the surface smooth, uniformly yellow, or purplish-yellow to purple, not speckled.

Lotus hispidus.

An annual, erect or ascending herb usually more hairy and stouter than the preceding, with longer stouter flower-stalks. Flowers usually four, sometimes three, the standard usually longer than broad; not fading to a green colour,

usually a deeper yellow than the preceding. Pod $\frac{1}{2}$ - $\frac{3}{4}$ inches long, rather thick. Seeds usually 1.1mm. long, almost round, the faces slightly less convex than the edges; surface usually speckled, smooth, with a fairly bright gloss, greenish-yellow, purplish-green to dark purple in colour, the speckles dark purple. The amount of speckling appears to be a varietal characteristic. Brown unspeckled seeds of this species may occur when the samples have been cut before maturity.

THE DESTRUCTION OF STAR THISTLE BY ARSENATE OF SODA.

DAVID L. BREEN,
Orchard Inspector.

A common method of destroying "Saffron Star Thistle" is to cut the plants with a hoe or scythe, or with a mowing machine when large areas have to be dealt with.

As a considerable area affected with this pest had to be destroyed in the Murray district and upon which, owing to the broken and stony nature of the country, it was not possible to use either a scythe or a mowing machine, it was decided to ascertain the effect of solutions of Arsenate of Soda of varying strength upon the vitality of this weed.

For the purpose of these trials eight lots of land, each 33 feet by 33 feet, were selected as being uniformly and well covered with Saffron Star Thistle (*Kentrophyllo lanatum*). The thistles on these plots were of different stages of maturity, and ranged in height from six inches to six feet.

The plots were sprayed with solutions of Arsenate of Soda, as hereunder:—

- Nos. 1 and 5—Arsenate of Soda, 1lb. to 4 gallons of water.
- Nos. 2 and 6—Arsenate of Soda, 1lb. to 8 gallons of water.
- Nos. 3 and 7—Arsenate of Soda, 1lb. to 12 gallons of water.
- Nos. 4 and 8—Arsenate of Soda, 1lb. to 16 gallons of water.

The spraying was done with a hand pump on 28th October, 1925, and the same quantity, about 10 gallons, was distributed on each plot. On October 30th the Star Thistles on Plots 1 and 5, which had received the strongest solutions were all dead, and on November 3rd when the next examination was made, the thistles, grass, and wattle and other scrub in all the plots were dead and so completely dried up that the whole area could have readily burned.

Judging by the result of this experiment it is quite practicable to check and destroy this pest by spraying with solutions of Arsenate of Soda, made by mixing 1lb. with 16 gallons of water, and further experiments may show that a weaker solution will be effective. Even with the whole area as thickly infested with Star Thistles as were the trial plots—a most unlikely contingency—the cost of the material for spraying an acre would range from 20s. to 25s.

Some thistles adjoining Plot 4, on which the weakest solution was used, received a light spraying owing to the effect of the wind, and were partially killed; it is therefore possible that a smaller quantity of solution than that used in the trials, viz., 400 gallons per acre, would prove effective. It is estimated that with proper equipment two men could spray one acre per day.

FOREST INSECTS.

THE MARRI BORER (*TRYPHOCHARIA HAMATA*).

J. CLARK, F.L.S.,

Assistant Economic Entomologist.

This beetle belongs to the large family *Cerambycidae*, the members of which are generally known as longicorns or long-horned borers. The present example is typical of the group to which it belongs, although superficially it closely resembles the species of the allied genus *Phoracantha*. The habits of the two groups are quite different. The species of *Tryphocharia* usually breed in living trees, whilst the *Phoracantha* in general prefer dying or dead timber, and are regarded as secondary borers. The larva of the *Phoracantha* eats its way through the sap wood in all directions, making the peculiar scroll-like markings generally found under the bark of dead trees. When nearly full grown it bores for a short distance into the hard wood, where it makes a small chamber and therein pupates.

The larva of *Tryphocharia* lives only for a short time in the sap wood, most of its life being spent in the hard wood in the interior of the tree.

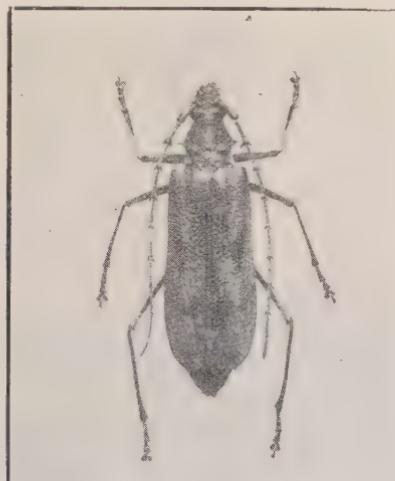


Fig. 1. (Original.)
Tryphocharia hamata (Newm.).
 Female, natural size.

The female (Fig. 1) is a handsome beetle, measuring from $1\frac{1}{2}$ to 2 inches in length. The wing covers are yellow; sometimes reddish yellow, with an irregular transverse brown band just in front of the middle, and an irregular blotch of the same colour behind the middle; the tips of the wing covers are always light yellow. The front part of the wing covers is deeply and coarsely punctured or pitted. These punctures become finer towards the tips which are almost smooth and shining. The tips of the wing covers are nearly straight across, not rounded, and are armed with four sharp spines. The two spines in the middle are longer and thinner than those on the outside. The thorax is reddish brown and very coarsely pitted on the top. There are

two large bluntly rounded tubercles, one on each side, behind. On each side at the middle there is a long, sharp spine, which is abruptly hooked backward at the point. The antennae do not quite reach to the tip of the wing covers; they have 11 joints; the first is large and club shaped; the second very short, and the remaining nine are about equal in length. The joints, three to eight, are armed with a sharp spine on each side at the apex. These spines are longest on the inside, on the third, fourth, and fifth joints than those on the outside; on the sixth joint both spines are equal in size; on the seventh and eighth they are longest on the outside. The antennae of *Phoracantha* have these spines only on the inside of the joints.



Fig. 2. (Original.)
Tryphocharia hamata (Newm.).
Male, natural size.

The male (Fig. 2) is smaller than the female, but the antennae are much longer. Otherwise they are very similar.

This beetle is found throughout the South-West from Perth to Albany. The males and females may be found flying early in the evening, at dusk, during January and February. During the day they are sometimes to be seen under loose bark on tree trunks. It attacks various Eucalypts, but appears to have a preference for Marri (*Euc. calophylla*). Other trees attacked are Tuart (*Euc. gomphocephala*), Blackbutt (*Euc. patens*), Wandoo (*Euc. redunca*, *Var. elata*), Red Flowering Gum (*Euc. ficifolia*), Red Tingle (*Euc. jacksoni*). Trees in all stages of growth are attacked, but for preference, young trees about a foot in diameter.

The eggs are elongate oval, almost cylindrical; they are greenish white in colour, and about one quarter of an inch long. They are of a very soft gelatinous nature, with a soft pliable skin or covering. They break at the slightest touch. When deposited by the female in the small cracks of the bark, these eggs are coated with a gummy substance which makes them adhere. On hatching from the egg the larva eats its way through the bark in a spiral direction, gradually working into the sap wood, through which it bores until strong enough to penetrate the hard wood. By the time the larva starts to bore up through the solid trunk it is about $1\frac{1}{2}$ inches long. From this point it bores its way upward in a very erratic course; at times boring into the sap wood at various sides of the tree. The larva continues to bore

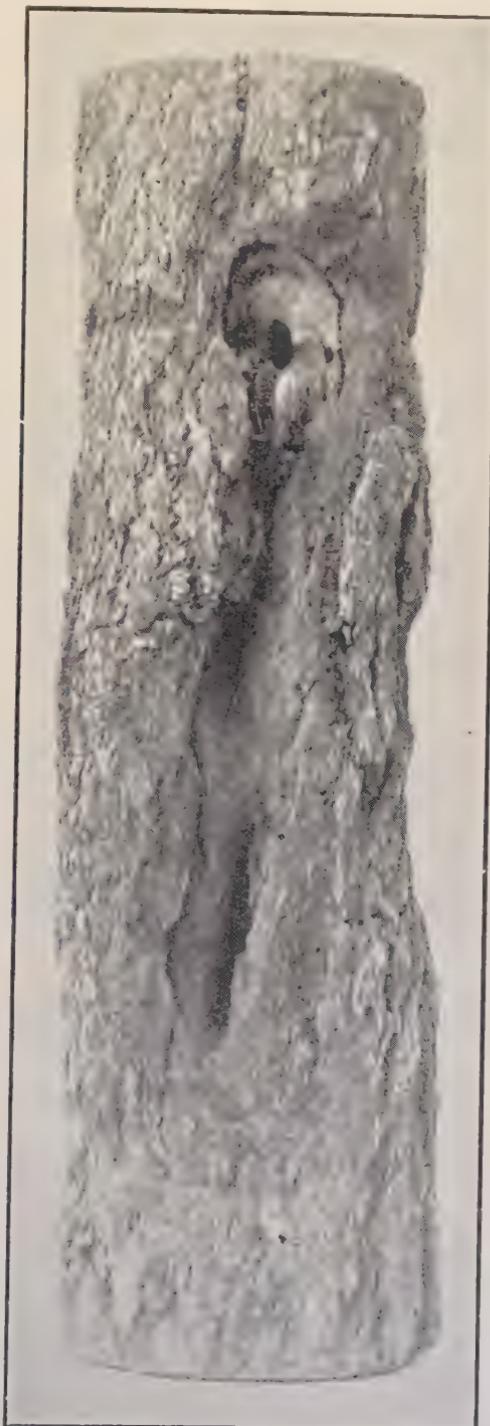


Fig. 3.

(Original.)

Portion of Marri sapling showing typical boring and ear-like wound made by the larva, or grub. Also the exit hole from which the adult beetle has issued.

upwards to from eight to 12 feet before it is full grown. At this stage it bores completely through the sap wood and sometimes through the bark, and excavates a broad channel about 18 inches long between the hard wood and the bark, completely cutting away the sap wood. At the top of this groove it cuts the peculiar typical "ear-shaped" mark (Fig. 3), in the centre of which it again bores into the hard wood, but this time in a downward direction for a distance of nine to 12 inches, forming a large pupal chamber. While forming this chamber the material is packed hard behind the larva, with the result that the entrance is solidly plugged.

The pupal chamber is made during April and May, but the larva, although lying in the chamber does not pupate until October or November. The beetle issues during December and January. The period passed by the larva in the tree is two years. For some reason, at present unexplained, the larva sometimes make what appears to be a dummy pupal chamber, usually

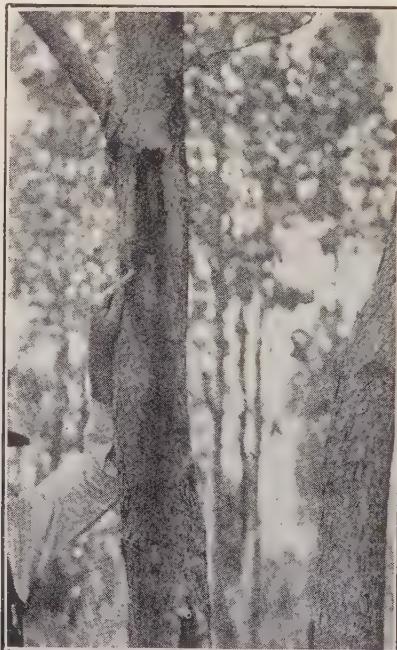


Fig. 4. (Original.)
Marri sapling showing both true (lower)
and dummy (upper) entrance to
pupal chamber.

only a few inches from the entrance to the true chamber (Fig. 4). This dummy is never occupied. The pupal chamber is generally about 15 feet up from the ground, frequently much higher. A number of trees containing these borers were kept under observation, and traps were attached as soon as the pupal chamber was made. These traps consisted of fine fly wire gauze nailed over the exit of the chamber (Fig. 5). To reach these a ladder was made by cutting notches in a sapling as in the photograph. A dozen traps were placed in one area, Mundaring Weir, each of these contained a beetle with no traces of parasites, which is surprising, as the larva is practically exposed during the period when it is boring between the bark and the sap-wood.

Many larvae fall victims to parasites when they bore into the sap wood during their erratic course upward. In numerous cases the work stops at this spot, and only the remains of the larval skins are to be found. Several *Braconid* wasps may be seen around borer infested trees, but so far none

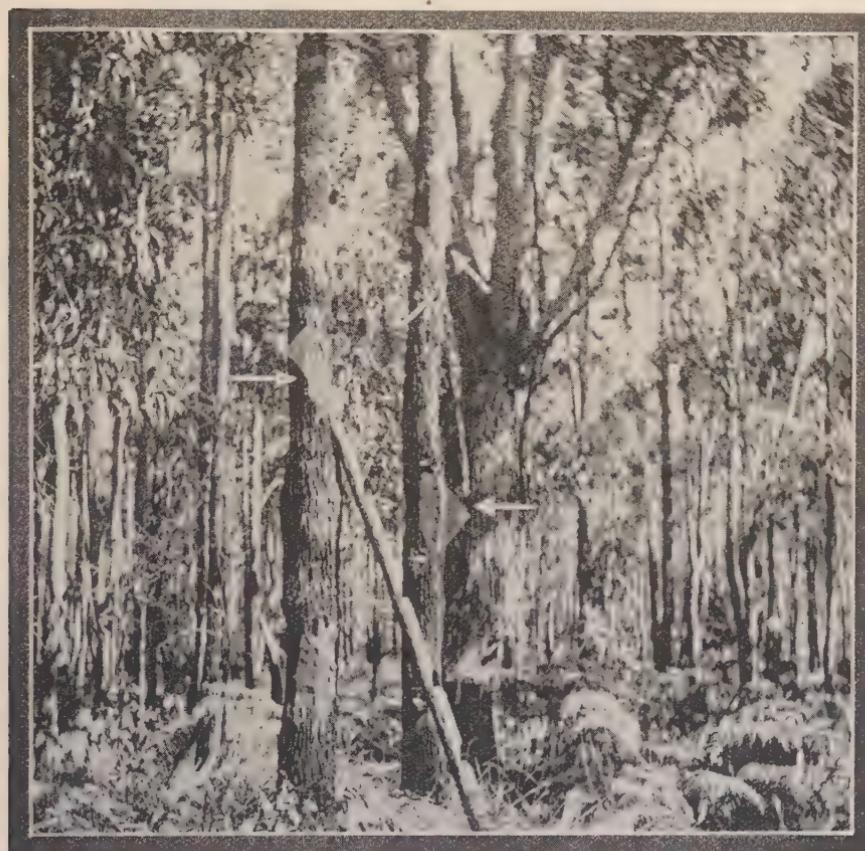


Fig. 5. (Original.)
Young Marri trees. Arrows indicate the traps attached over exit from
pupal chamber.

have been reared from larvae or pupae. Black cockatoos (*Calyptorhynchus* sp.) frequently tear the bark off in their efforts to get the larvae, but from general appearances it does not seem as though they get many of them. The destruction caused by this bird is almost as bad as that done by the borer, as it frequently completes the damage by girdling the tree.

It has been recorded that this borer is the main cause of kino, or red-gum, and of gum-veins in Marri. Such, however, is not the case. Whatever the cause of kino and gum-veins may be, insects play very little, if any, part in their formation. Many trees badly affected with gum-veins have been proved after careful examination to contain no traces of borers. On the other hand Marri trees with *Tryphocharia* borers have been found entirely free from kino and from gum-veins. When the borer strikes a gum-vein the burrow fills up with the kino, and the larva is destroyed. These burrows frequently act as reservoirs for kino.

EXTRACTS FROM REGULATIONS UNDER "THE STOCK DISEASES ACT, 1895," FOR THE GUIDANCE OF SHEEP OWNERS.

COMPULSORY DIPPING AREA.

South-West Division of the State South of the Eastern Railway.

32. (a) Every owner of sheep within the boundaries of that part of the South-West Division South of the Eastern Railway shall after the shearing of such sheep and before the 30th day of April in each year, dip or cause to be dipped, in a swim bath prepared with some specific known to be fatal to ticks and lice, all sheep running on land whereof he is the owner or occupier.

(c) For every sheep not dipped as provided in this regulation, within the period prescribed above, the owner shall be liable to a fine not exceeding two shillings.

South-West Division of the State North of the Eastern Railway.

32. (b) Every owner of sheep within the boundaries of that part of the South-West Division North of the Eastern Railway shall, after the shearing of such sheep and before the 28th February in each year, dip or cause to be dipped, in a swim bath prepared with some specific known to be fatal to ticks and lice, all sheep running on land whereof he is the owner or occupier.

Ewes with lambs—time for dipping.

33. Notwithstanding anything contained in these regulations, it shall not be necessary to dip ewes affected with ticks or lice during such time previous to or after their lambing as the inspectors may appoint, and for such purpose any inspector may, in respect of such ewes, extend any notice to dip for such time as he shall think fit.

Statutory Declaration to be supplied within seven days after dipping.

34. Within seven days after the dipping of his sheep the owner shall make a statutory declaration before a justice of the peace, to the effect of Schedule 5a hereto, stating that he has dipped his sheep in accordance with the provisions of these regulations, the date of dipping, the number of sheep dipped, and the class of dip used, and he shall forward such declaration to the police officer in charge of the police station nearest to him. Such declaration shall be forwarded by the said police officer to the Chief Inspector of Stock.

Note.—It is essential that the following information be shown on the declaration:—

1. The Road Board District in which the holding is situated where the sheep are held.

2. The strength at which the dip is used, i.e., number of packets to the number of gallons. The information "according to directions on packet" is not sufficient.

Permits to move sheep in the Gascoyne.

Every owner of sheep in the area defined in the Schedule hereto must, before travelling or removing or causing to be removed, or attempting to remove, any sheep to any place outside the said area, obtain a permit to remove such sheep from an inspector of stock, who shall not issue the said permit unless he is satisfied that the sheep intended to be so removed out of the prescribed area are free from parasites known as tick and lice; and every person contravening this regulation by act or omission shall be punishable summarily, and upon conviction be liable to a penalty not exceeding one hundred pounds and not less than fifty pounds.

Schedule.

That portion of the State bounded on the South by the Northern boundary of the South-West Division, commencing at the sea-coast and proceeding as far as the intersection of such boundary with the 115.5 meridian of longitude; thence following such meridian Northerly to the intersection of the sea-coast; thence along the sea-coast to the starting point.

Lice or tick-infested sheep in any part of the State.

36. (a) If an inspector is satisfied that a flock depasturing in any part of the State is affected with tick or lice, he shall give the owner thereof notice to dip such stock forthwith to the satisfaction of the inspector or his agent.

Provided that the owner who refuses, neglects, or fails to comply with such notice on or before the date specified therein shall be liable on conviction to a penalty not exceeding fifty pounds for the first offence, and if immediately after conviction for the first offence such sheep shall not be dipped to the entire satisfaction of the inspector, such owner shall upon conviction be liable to a further penalty not exceeding fifty pounds, and so on for each and every succeeding conviction.

Tick or lice on sheep exposed in a public market or exhibited for show purposes or any other place where offered for sale.

36. (b) If any sheep affected with tick or lice shall be found in any pound, or in any yard or yards, or on any land or other place at which sheep are offered for sale or exhibited for show purposes, the owner exposing the sheep so affected shall be liable to a penalty not exceeding fifty pounds: Provided that any inspector, if he deems it necessary, may order the withdrawal from sale of any sheep affected with ticks or lice until such sheep have been dipped or dressed to the satisfaction of such inspector or any other inspector, and shall give notice to the aforesaid owner of such sheep to dip or dress the same forthwith, at such place as the inspector may direct; and every such owner who refuses, neglects, or fails to comply with the aforesaid notice is liable to a further penalty not exceeding twenty pounds. But if the inspector is satisfied that such sheep are intended for immediate slaughter, he may withhold such notice to dip.

A SERIOUS MORTALITY IN SHEEP.

(Ascribed to poisoning with *Gastrolobium villosum*, "Crinkly Leaf Poison.)

H. W. BENNETTS, M.V.Sc.,

Veterinary Pathologist.

Recently heavy losses in sheep on a property at Lower Chittering were reported to this Department. An investigation was made, and it was ascertained that the owner had lost 157 out of a total of 180 sheep, purchased about a month previously. This almost complete decimation of the flock took place in three or four days.



Crinkly Leaf Poison.

A *post mortem* examination of two wethers gave indications of the trouble being due to ingestion of poison plants, viz., gastro-enteritis and congestion of the lungs, liver, and kidneys. This theory was strongly supported by the history, especially the sudden and severe mortality.

Crinkly Leaf poison, apparently the only poison plant on the property, was present in abundance and was in the flowering stage. Specimens were identified by the Government Botanist. This plant is known to be a bad poison, and is stated by Herbert to be "poisonous at all periods of its growth, but especially so when flowering or fruiting."

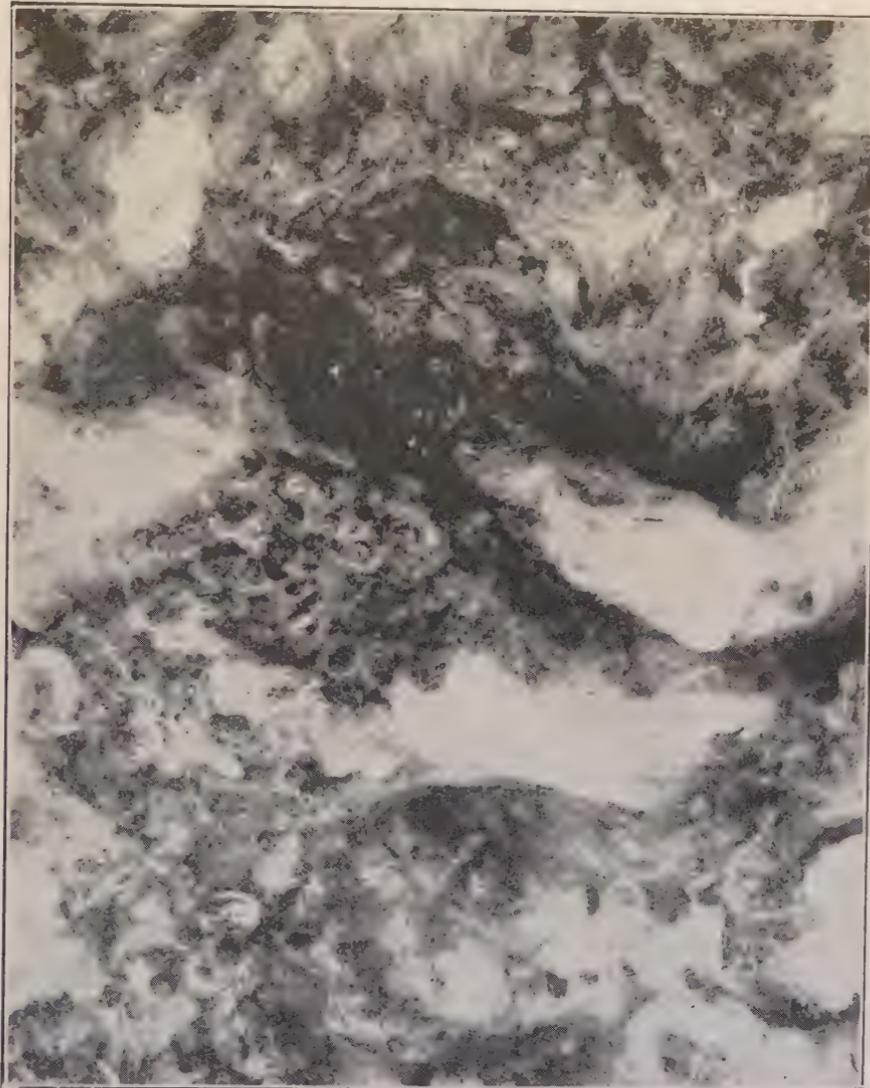
It is interesting to note, which strongly incriminates it as being the cause of the present trouble, that this plant was reported by Dr. Morrison in 1899 as having caused the death of 400 sheep in one day; also in this same district.

I undertook feeding experiments on guinea pigs with samples of the plant from Lower Chittering. The plant was minced up finely, mixed with bran, moistened with water and fed to guinea pigs. The results of these experiments were negative. It appears that guinea pigs are not very susceptible to the effects of this and some other native plants which are known to be poisonous.

IT PAYS TO SKIRT THE FLEECE PROPERLY.

The illustration herewith represents the burry part of a fleece found in a bale of otherwise super wool displayed on the show floor for the Perth wool sales last November.

This fleece and a very few others in this "lot" were the only ones from which the whole of the burry portions had not been skirted. The presence



The burry portion of an improperly skirted fleece.

of the burry skirtings obviously reduced the value of the fleeces on which they were left, but what is not so obvious to the grower is that their pre-

sence also reduced the value of the whole of the wool in the line of eighteen bales, of which that in the five show bales was representative. Further, the finding of the burry portion compelled the American buyer, who was examining and valuing this "lot," to cease valuing it at once, as the American requirements demanded that only wool free from burrs and other vegetable matter be purchased.

Valuable competition for an otherwise suitable line was thus lost, with the result that the price realised was 22d. instead of a possible 25½d. per lb. This instance most emphatically demonstrates that the benefits of "skirting" are lost if it be not done properly.

If the competition of the American and the best British and Continental buyers is desired, it is not sufficient to remove portion of the skirting; all the burry and dissimilar skirtings must be removed from the clean and main portion of the fleece wool. Each class or description will then be available to the buyer for whom it is suitable, secure the greatest competition, and sell at the highest rates. (The Director of Agriculture.)

LIVE STOCK AND MEAT.

For the information of readers of the "Journal," the following particulars have been supplied by Messrs. Elder, Smith, & Co., Limited, Perth:—

COMPARATIVE YARDINGS OF STOCK AT METROPOLITAN FAT STOCK MARKETS,
DURING MONTHS OF SEPTEMBER, OCTOBER AND NOVEMBER, 1925.

	SEPTEMBER.					OCTOBER.				NOVEMBER.			
	2.	9.	16.	23.	30.	6.	14.	21.	28.	4.	11.	18.	25.
Sheep and Lambs	8,251	10,536	9,401	9,941	12,576	9,567	12,415	15,100	19,514	13,202	15,983	14,129	19,785
Cattle ...	870	719	989	851	791	635	588	992	774	884	908	755	721
Pigs ...	753	789	773	750	655	432	861	814	731	503	733	516	296

COMPARATIVE VALUES OF STOCK SOLD AT METROPOLITAN FAT STOCK MARKETS,
DURING MONTHS OF SEPTEMBER, OCTOBER AND NOVEMBER, 1925.

	SEPTEMBER.					OCTOBER.				NOVEMBER.			
	2.	9.	16.	23.	30.	6.	14.	21.	28.	4.	11.	18.	25.
Mutton	11	10½	10½	10½	10½	W 10½ OS 5½	W 10½ OS 5½	OS 5½	OS 6	OS 6½	OS 6½	OS 5½	OS 5½
Beef ...	6	5½	5½	5½	5½	5½	5½	5½	5½	5½	5½	5	5
Pork ...	11½	11½	10½	10	10½	10½	10½	10	9½	10	8½	8½	8½
Bacon ...	10	10	10½	10½	10½	11	10½	9½	9	9½	8½	8½	8½

NOTE.—W—in wool;

OS—off shears.

MARKET REPORT.

The following particulars of the approximate quantity of chaff available for auction at the Metropolitan Chaff and Grain Auction Sales held in Perth during the months of September, October, and November, 1925, also the minimum and maximum prices ruling for f.a.q. to prime quality during those months, have been supplied by Messrs. H. J. Wigmore & Co., Limited, of Wellington Street, Perth, and will be valuable for reference:—

Wheaten Chaff—

September: Quantity—1,850 tons.

Maximum price—£7 15s. per ton.

Minimum price—£6 7s. 6d. per ton.

October: Quantity—1,800 tons.

Maximum price—£7 per ton.

Minimum price—£6 5s. per ton.

November: Quantity—2,300 tons.

Maximum price—£6 2s. 6d. per ton.

Minimum price—£5 5s. per ton.

The £7 15s. per ton, shown as the maximum price in September, was the top price for the season, and was secured for a truck or two only at the beginning of September, when owing to the dry spell then being experienced, buyers were anxious and inclined to speculate. However, after falls of rain, holders were eager to quit, and the market generally receded. The first new season's chaff arrived in the market on the 28th of October, but for a week or two the sample was insufficiently cured. However, during the last half of November the quality arriving was all that could be desired, and with trucks plentiful, and practically all chaff-cutting plants working, the market was for a few days glutted, and values fell to £5 5s. However, evidently farmers were not prepared to market at this figure, and with shorter supplies arriving, the market recovered and at the time of writing, 10th December, 1925, is steady at £5 15s. per ton.

Oaten Chaff.—Supplies of this at any stage during the three months mentioned above were not heavy. Of course prices were influenced by the prices ruling for wheaten. Very little oaten chaff was marketed during November, and for a day or two the supplies were so short that several consignments of oaten chaff realised prices higher than prime wheaten. At the time of writing supplies are not adequate to meet the demand, and consignments arriving should meet a satisfactory market.

Oats.—Prices ruling during the last three months have been considerably better. This is accounted for chiefly by the dry spell in Victoria, causing Melbourne buyers to operate on this market, and during the first half of November good clean heavy Algerian oats, packed in bags fit for shipment, were realising from 2s. 11d. to 3s. 1d. per bushel. An immediate shortage was not the cause of Victorian operations, but we think that the crop prospects in that State resulted in merchants speculating. However, after a

fine fall of rain in the Victorian oat districts, which it is understood will benefit the oat crops, buyers entirely withdrew. During the course of the last few days Victoria has been again inquiring, but their indications of value are rather too low to permit of business being done. While writing, we would mention that merchants in the Eastern States will accept only good clean heavy feed Algerians, and, furthermore, they must be packed in good sound bags in accordance with the law in Victoria, which prohibits the use of super. bags for packing oats. While very little business is being done at present with Victoria for future requirements, a few merchants in Perth still have contracts to fill for sales made a few weeks ago, and good clean heavy feed Algerians packed in good bags are realising from 2s. 9d. to 2s. 9½d. on the Perth market. Good heavy feed Lachlans are selling at around 2s. 8d., but light feeds and others, such as Burt's Early, Rua Kura, etc., are in poor demand, and are selling at from 2s. 1d. to 2s. 5d. per bushel, inferior realising lower rates. From present indications we believe that good clean heavy feed Algerians, packed as mentioned above, would meet with a satisfactory market.

Wheat.—At the time of writing, the market is firm, and supplies arriving in Perth are extremely scarce. F.a.q. is worth 6s. 6d. to 6s. 7d. per bushel.

Barley.—A few consignments of new season's Cape have arrived during the last few days, but the market is dull, and consignments have been quitted at from 3s. 2d. to 3s. 3d. per bushel.



METEOROLOGICAL INFORMATION.

1925.

STATIONS.	TEMPERATURE.			RAINFALL.			TEMPERATURE.			RAINFALL.			
	Maximum.		Minimum.	For Month.		Aver-	Maximum.		Minimum.	For Month.		Aver-	
	Highest.	Mean.	Lowest.	Mean.	Highest.	Mean.	Mean.	Highest.	Mean.	Mean.	Lowest.	age.	
SEPTEMBER, 1925.													
Chapman State Farm	71.4	90.7	47.7	40.1	72.9	95.5	48.8	42.5	0.82	87.9	107.4	46.4	
Geraldton State	... 72.2	84.0	52.4	40.4	1.37	70.9	54.4	45.0	0.96	0.71	82.6	60.0	
Walebing State	68.3	84.2	42.8	43.9	2.17	70.0	45.4	35.1	1.32	86.3	107.0	62.9	
Perth State	... 68.4	81.2	49.1	40.1	3.54	88.1	51.9	42.1	2.18	80.2	100.5	56.7	
Kalamunda State	67.8	79.0	48.5	39.0	4.68	69.8	50.0	38.6	2.96	81.9	102.4	59.1	
Bunbury State	67.3	77.8	50.1	41.9	4.75	57.0	65.8	52.8	42.4	79.0	100.0	56.0	
Bridgeport State	67.1	81.5	40.4	29.9	4.08	64.8	81.0	44.3	3.45	80.7	102.0	48.5	
Albany State	64.1	78.6	48.3	38.0	3.16	62.7	74.0	49.7	42.4	82.6	91.6	55.6	
Meredin State Farm	...	40.0	30.2	0.98	0.96	...	45.0	35.7	0.53	0.89	...	57.8	49.8
Northam State	69.1	81.9	43.3	34.3	2.36	1.65	69.6	47.3	38.3	0.50	1.00	90.8	104.5
York State	... 70.2	83.0	35.0	1.72	1.65	71.3	89.0	45.8	37.0	0.63	1.05	56.6	48.4
Narrogin State Farm	66.3	73.0	41.4	32.7	1.55	2.36	68.4	85.0	43.0	33.6	1.43	88.5	98.5
Katanning State	65.6	80.4	41.6	32.0	2.72	1.96	64.9	80.0	44.4	37.0	2.60	80.1	100.7
Cape Leenwin	63.7	73.5	53.0	47.0	3.86	3.16	63.3	53.7	71.0	53.7	46.0	2.46	2.85
OCTOBER, 1925.													
NOVEMBER, 1925.													
Chapman State	... 71.4	90.7	47.7	40.1	72.9	95.5	48.8	42.5	0.82	87.9	107.4	46.4	
Geraldton State	... 72.2	84.0	52.4	40.4	1.37	70.9	54.4	45.0	0.96	0.71	82.6	60.0	
Walebing State	68.3	84.2	42.8	43.9	2.17	70.0	45.4	35.1	1.32	86.3	100.5	56.7	
Perth State	... 68.4	81.2	49.1	40.1	3.54	88.1	51.9	42.1	2.18	80.2	102.1	59.1	
Kalamunda State	67.8	79.0	48.5	39.0	4.68	69.8	50.0	38.6	2.96	81.9	102.4	57.3	
Bunbury State	67.3	77.8	50.1	41.9	4.75	57.0	65.8	52.8	42.4	79.0	100.0	56.0	
Bridgeport State	67.1	81.5	40.4	29.9	4.08	64.8	81.0	44.3	3.45	80.7	102.0	48.5	
Albany State	64.1	78.6	48.3	38.0	3.16	62.7	74.0	49.7	42.4	82.6	91.6	55.6	
Meredin State Farm	...	40.0	30.2	0.98	0.96	...	45.0	35.7	0.53	0.89	...	57.8	49.8
Northam State	69.1	81.9	43.3	34.3	2.36	1.65	69.6	47.3	38.3	0.50	1.00	90.8	104.5
York State	... 70.2	83.0	35.0	1.72	1.65	71.3	89.0	45.8	37.0	0.63	1.05	56.6	48.4
Narrogin State	66.3	73.0	41.4	32.7	1.55	2.36	68.4	85.0	43.0	33.6	1.43	88.5	98.5
Katanning State	65.6	80.4	41.6	32.0	2.72	1.96	64.9	80.0	44.4	37.0	2.60	80.1	100.7
Cape Leenwin	63.7	73.5	53.0	47.0	3.86	3.16	63.3	53.7	71.0	53.7	46.0	2.46	2.85
DECEMBER, 1925.													
Chapman State	... 71.4	90.7	47.7	40.1	72.9	95.5	48.8	42.5	0.82	87.9	107.4	46.4	
Geraldton State	... 72.2	84.0	52.4	40.4	1.37	70.9	54.4	45.0	0.96	0.71	82.6	60.0	
Walebing State	68.3	84.2	42.8	43.9	2.17	70.0	45.4	35.1	1.32	86.3	100.5	56.7	
Perth State	... 68.4	81.2	49.1	40.1	3.54	88.1	51.9	42.1	2.18	80.2	102.1	59.1	
Kalamunda State	67.8	79.0	48.5	39.0	4.68	69.8	50.0	38.6	2.96	81.9	102.4	57.3	
Bunbury State	67.3	77.8	50.1	41.9	4.75	57.0	65.8	52.8	42.4	79.0	100.0	56.0	
Bridgeport State	67.1	81.5	40.4	29.9	4.08	64.8	81.0	44.3	3.45	80.7	102.0	48.5	
Albany State	64.1	78.6	48.3	38.0	3.16	62.7	74.0	49.7	42.4	82.6	91.6	55.6	
Meredin State Farm	...	40.0	30.2	0.98	0.96	...	45.0	35.7	0.53	0.89	...	57.8	49.8
Northam State	69.1	81.9	43.3	34.3	2.36	1.65	69.6	47.3	38.3	0.50	1.00	90.8	104.5
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Narrogin State	66.3	73.0	41.4	32.7	1.55	2.36	68.4	85.0	43.0	33.6	1.43	88.5	98.5
Katanning State	65.6	80.4	41.6	32.0	2.72	1.96	64.9	80.0	44.4	37.0	2.60	80.1	100.7
Cape Leenwin	63.7	73.5	53.0	47.0	3.86	3.16	63.3	53.7	71.0	53.7	46.0	2.46	2.85

WESTERN AUSTRALIA—DEPARTMENT OF AGRICULTURE.

List of Bulletins available for Distribution.

No. 5.—*Fruit Drying*. By J. F. Moody. Free.
 No. 15.—*Root Rot*. By A. J. Despeissis. Free.
 No. 20.—*The Pruning of Fruit Trees*. By J. F. Moody. Price 2s. 6d.
 No. 30.—*Codlin Moth*. L. J. Newman. (Reprint from "Journal.")
 No. 46.—*Fruit Packing and Marketing and Exporting of Fruit*. By J. F. Moody and J. Ramage. Price 1s. 6d.
 No. 47.—*The Poultry Keeper's Manual*. By G. Allman. Price 1s.
 No. 83.—*Horticulture and Viticulture*. By A. Despeissis. Price 2s.
 No. 49.—*The Feeding of Horses*. By Professor Paterson and G. L. Sutton. Free.
 No. 57.—*Vermif Destruction*. By A. Crawford. Free.
 No. 60.—*The Farmer's Clip*. By J. J. Mahood. Free.
 No. 68.—*Flaying and Treatment of Hides*. By R. E. Weir. Free.
 No. 72.—*The Potato: Its Cultivation, Pests, and Diseases*. By G. N. Lowe, L. J. Newman, D. A. Herbert. Free.
 No. 74.—*Tobacco Growing: Notes for Intending Planters*. By G. W. Wickens. Free.
 No. 79.—*Sheep on the Wheat Farm and their Management in W.A.* By H. McCallum. Free.
 No. 87.—*Sheep Feeding Experiments: State Farm, Chapman, 1920*. By G. L. Sutton and F. Vanzetti. Free.
 No. 88.—*Light Land: Conference*. By G. L. Sutton. Free.
 No. 90.—*Stock Waters: Standard for Composition of*. By E. A. Mann. Free.
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 No. 103.—*Kerosene Method for Eradicating the Zamia Palm*. By G. K. Baron-Hay. Free.
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 No. 105.—*Pedigree Selection of Seed*. By G. L. Sutton. Free.
 No. 106.—*The Red Legged Velvet Earth Mite*. By L. J. Newman. Free.
 No. 107.—*Sudan Grass*. By G. L. Sutton. Free.
 No. 109.—*Rape*. By G. L. Sutton. Free.
 No. 111.—*Standard Wheat Varieties*. By G. L. Sutton and F. Vanzetti. Free.
 No. 112.—*Automatic Device for Eradication of Stickfast Flea*. By G. Allman. Free.
 No. 113.—*Picked Pieces (Classification of Clip)*. Free.
 No. 114.—*Blue Mould on Citrus Fruits*. By W. M. Carne. Free.
 No. 115.—*The Value of Windmills for Pumping Water in W.A.* A. H. Scott.
 No. 116.—*Spotted Wilt of Tomatoes*. W. M. Carne.
 No. 117.—*Cream*. P. G. Hampshire.
 No. 118.—*Pigs and Pig Raising*. P. G. Hampshire.
 No. 119.—*Take-all of Wheat and Similar Diseases of Cereals*. By W. M. Carne and J. G. C. Campbell.
 No. 120.—*Pastures in the South-West*. A. B. Adams. (Reprint from "Journal.")
 No. 121.—*Midew, Septoria, Leaf Spots, and Similar Diseases of Cereals*. W. M. Carne and J. G. C. Campbell.
 No. 122.—*Fruit Fly. Description and Control*. L. J. Newman.
 No. 124.—*Government Inspection of Wheat*. G. K. Baron-Hay. (Reprint from "Journal.")
 No. 125.—*Buy Good Seed*. (Advice to Farmers.) W. M. Carne. (Reprint from "Journal.")
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